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A CLINICAL AND BACTERIOLOGICAL SURVEY OF PNEUMONIA IN CHILDHOOD

BY

ESTHER HENDRY, M.D., D.C.H.

(From the Department of Paediatrics, Glasgow University and the Roya Hospital for Sick Children, Glasgow)

Largely through the work of Cooper and her co-workers (1929), thirty-three fairly distinct types of pneumococci have been isolated. This subdivision, however, is not final. Types 6 and 26 are now understood to be identical, as also are types 15 and 30, whereas the Wilder strain, numbered type 33 is now thought to be related to type 9. In the light of Cooper's (1929) classification, workers on both sides of the Atlantic have studied the different types in health and disease. The strains most often encountered vary from country to country and even from district to district, and epidemics due to one particular strain of pneumococcus have been reported. Although it is generally agreed that certain types are more usually isolated in disease than in health, those infesting the upper respiratory tract of normal subjects may also be pathogenic. This frequently occurs in respiratory disease in children, who have had little opportunity to develop immunity to organisms which may be regarded as innocuous inhabitants of the adult throat (Cooper, Rosenstein, Walter and Peizer, 1932; Nemir, Andrews and Vinograd, 1936).

The present investigation is based on a study of one hundred and eighty-six consecutive cases of pneumonia admitted to one of the medical units of the Royal Hospital for Sick Children, Glasgow, between October 1, 1939, and September 30, 1940. These cases have been reviewed with special reference to the course, complications, response to treatment and mortality rate in relation to the type of organism isolated from the throat or the nose, from purulent exudate and post-mortem specimens. Twenty-three cases suffering from conditions other than pneumonia from which the pneumococcus was recovered are also included. The ages of the children ranged from four days to twelve years.

Investigation

Methods. Throat, and sometimes also nasal swabs were taken from all the patients on admission, at intervals during their stay in hospital, and in a follow-up after discharge. In some instances cultures of pus from middle ear or pleura were also obtained to compare with the throat cultures, and, in fatal

cases coming to autopsy, cultures from the lung, the spleen and bile, provided further material for investigation. The causal organism was identified by intraperitoneal injections of broth culture into mice and by using the resulting peritoneal exudate, or sometimes heart blood cultures, for typing with Lederle's series of immune sera. The criterion determining the specific type was capsule swelling (Neufeld reaction).

Clinical material. Of the one hundred and eighty-six cases, one hundred and eighty-two suffered from primary and four from secondary pneumonia. The diagnosis was based on clinical and radiographic findings and in a considerable number of the fatal cases confirmed by post-mortem examination. In one hundred and six (57 per cent.) of the one hundred and eighty-six cases a pneumococcus was recovered from the throat or elsewhere, either when the child was admitted or on subsequent attempts to isolate the organism. In the remaining eighty cases, streptococci, staphylococci, coliform bacilli or a mixture of these, were the only organisms found on repeated examination. The cases could thus be divided into two groups: (1) those infected with the pneumococcus, and (2) those infected with other organisms. This distinction will be maintained during discussion of the various points under review.

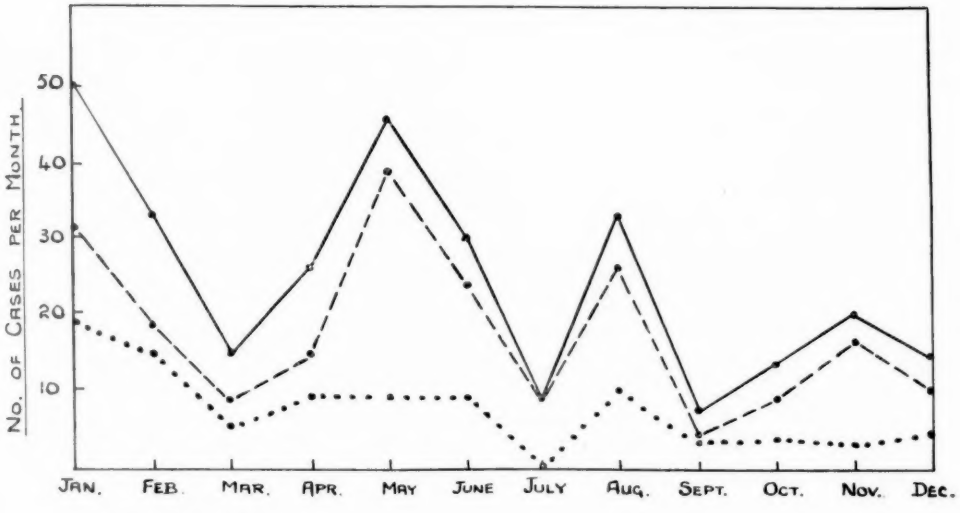
The incidence of pneumonia. Pneumonia is a disease of the winter and spring months. Finland (1937), in reviewing three thousand six hundred and eighty-two cases in Boston City Hospital, found that the greatest number occurred from January to March, while Bullowa (1937) states that December, January, February and March were his peak months. His 'type' incidence varied from month to month while Finland's (1937) remained constant throughout the year. According to Reimann (1938), pneumonia is of frequent occurrence in sparsely populated districts where the inhabitants, as is the case with young children, have had little chance to acquire immunity from repeated mild infections; he also considers that upper respiratory tract infection, by lowering the patient's resistance, predisposes to the disease. This lack of acquired immunity is probably the reason for the high incidence of pneumonia in children under two years of age (Bullowa, 1937; Finland, 1937) who are specially liable to become infected by one of the 'higher' types of pneumococci inhabiting a presumably healthy adult carrier's throat. Andrews (1937) has investigated a large series of cases in children for evidence of contact infection in the home and has come to the conclusion that, with certain types (1, 5, 14, 22, 25, 8, 10 and 17) more commonly encountered than others, the pneumonia was always due to the strain isolated from the child's throat, and that in infants and young children especially, familial infection was a frequent occurrence.

Fig. 1 shows the seasonal incidence of the cases in the present series. The continuous line indicates the total for each month, the interrupted line those cases which yielded a pneumococcus and the dotted line those from which some other organism was obtained on culture. The figure shows that there were epidemics of pneumonia in January, May and August. The unexpected rises in incidence in May and August were caused mainly by infection with type 19 pneumococcus. This organism accounted for 20·8 per cent. of all cases taking the year as a whole, for 30·9 per cent. of the cases occurring in May and for 40 per cent. of those occurring in August. It was only in these months that a single type of pneumococcus was responsible for a high proportion of the cases. There was nothing to suggest that these cases in May and August had any common source of infection or that bad housing, allowing infection to spread from adult carriers, was more frequently a predisposing factor at these times than at any others.

Age and sex incidence. Sixty-four (60·3 per cent.) of the children suffering from pneumococcal pneumonia were under two years of age while fifty-nine (73·7 per cent.) of the cases of non-pneumococcal pneumonia occurred in this

FIGURE I.

To Show the Seasonal Incidence of Pneumonia.



——— All cases.

·—·—· Pneumococcus positive cases.

····· Pneumococcus negative cases.

age group. These figures are in agreement with those of other workers. Sixty-four were males and one hundred and twenty-two females, a ratio of 1: 2. Bullowa's (1937) sex incidence, however, was 7 males to 3 females for both adults and children.

Housing conditions. In the series under review, bad housing conditions seemed to predispose to pneumococcus infection though no one type of pneumococcus was particularly responsible. Taking three persons or more per room as indicating over-crowding, it was found that sixty-five (61·3 per cent.) of the pneumococcus positive cases and twenty-nine (36 per cent.) of the pneumococcus negative came from over-crowded homes. This high incidence of infection with pneumococci among children living in over-crowded houses is probably due to close contact with adult carriers. No attempt was made, however, to substantiate this supposition by making cultures from the throats of adults in contact with the patients.

The course of the disease. With the exception of the relatively small number of cases which ended fatally, the disease generally ran a mild to moderately severe course for both groups of patients. In most, the onset was sudden with pyrexia ranging from 100 to 104° F., but under treatment with sulphapyridine, which was given as a routine to all patients, this dropped to normal in the course of three or four days. It was customary to continue administration of the drug for three to four days after the temperature had subsided and the pulse and respiration rates had returned to normal. The period during which the drug was given has been regarded as the duration of the acute stage of the illness. This for pneumococcus positive cases averaged 8·75 days and 7·6 days for those infected with other organisms.

The white cell counts, which may be taken as a measure of the patient's reaction to the invading organism, were surprisingly low and there was no

evidence that any one type of pneumococcus evoked a particular response. The average count was 17,273 white blood cells per c.mm.; the highest being 45,600, with a type 19 infection, and the lowest 8,400 per c.mm. with type 6. The highest count met with amongst the cases of empyema was only 22,800. As only the counts registered on admission have been taken into consideration, the question of agranulocytosis following administration of sulphapyridine does not arise. For the non-pneumococcal groups, the average white cell count was slightly lower at 14,200 per c.mm. The maximum was 34,000 and the minimum 6,000 per c.mm.

An uncomplicated recovery was the rule and occurred in ninety (85 per cent.) of the group 1 cases and seventy-two (90 per cent.) of the group 2 cases. Second attacks of pneumonia within a year of the first attack were recorded in 5 per cent. of the children in the first group and in 6·1 per cent. of those in the second group.

Complications. In both groups 1 and 2, otitis media was the complication most frequently encountered. It occurred in seven cases in group 1 and in eight in group 2. In the seven cases of group 1 the types of pneumococcus found were types 6, 22, 23, in two cases, 24 and 29 and in one case a mixed infection with types 20 and 31. All the seven cases in group 1 died and two of those in group 2.

Empyema occurred in six patients with pneumococcus pneumonia, but in none of the cases with other infections. In three cases type 1 was the infecting organism; in two it was type 6 and in one type 11. The last was the only case which died. Two children suffering from type 1 empyema made a slow recovery; the elder of these, a boy of eight years, had contracted a type 1 empyema for the second time in four years. In all, save the child who died, complete recovery ultimately took place.

Three cases developed meningitis. The infecting organisms were types 6, 19 and 25 respectively. Two of these children were under one year of age, both came from poor and over-crowded homes and were acutely ill when admitted to hospital. The causal pneumococcus was isolated from the throat swab in each case. The patients offered no resistance to the infection and showed a poor response to treatment with sulphapyridine. Meningitis developed on the seventh day after admission in the child with type 6 infection and on the fourteenth day in the type 19 infection. In the third case, a type 25 organism was isolated from the cerebrospinal fluid during life, and at autopsy from splenic tissue and from the lung which showed broncho-pneumonic consolidation.

In the only case developing peritonitis, it was impossible to determine the type of infecting organism. The child, aged one year and three months, was admitted with bronchopneumonia, and during the first two weeks in hospital pneumococci, types 3 and 14, were repeatedly isolated alone and as a ' double ' infection from throat swabs. The child failed to make any progress and developed peritonitis the day before death, four weeks after admission. As post-mortem examination was refused, peritoneal exudate was unobtainable for culture.

Arthritis occurred in one case of type 23 pneumonia. The child, aged nine weeks, at first seemed to do well on sulphapyridine, but after three weeks a relapse occurred, chest signs again appeared and swelling of the right knee was noted. Culture from a throat swab and from the fluid aspirated from the joint yielded type 23 pneumococcus. After a second course of sulphapyridine both lung and joint lesions healed satisfactorily and the child was discharged well.

Mortality. Nemir, Andrews and Vinograd (1936) are of the opinion that the mortality rate in pneumonia in childhood is dependent on age, type of infecting pneumococcus, pathological type of pneumonia (whether croupous

or catarrhal) or a combination of these factors. Their death rate was 18 per cent. and they found that fatal results occurred most often in children under two years of age and in infections with types 1 and 4 pneumococcus. Reimann (1938) records a death rate of 15 per cent. for children under two years of age and makes special mention of the virulence of type 5 infections. In children over two years of age the death rate was 5 to 6 per cent. Bullowa's (1937) figures for the two age groups are 18·8 per cent. for the ' under twos ' and 3·7 per cent. for the ' over twos.' Sulphapyridine was not used in the treatment of any of these cases.

In the present series there were twenty-five deaths, giving a death rate of 13·5 per cent. In the cases under two years of age with pneumococcal infection there were fifteen deaths (23 per cent.) and in those over that age two deaths (5 per cent.). Among the cases in the non-pneumococcal group there were eight deaths (14 per cent.) in the children under two years and none in those over that age. Taking both bacteriological groups together the mortality rate under two years was 19 per cent. and over two years 3 per cent. (see table 1).

TABLE 1

MORTALITY

AGE GROUPS	PNEUMOCOCCAL INFECTION		OTHER ORGANISM		TOTAL PERCENTAGE
	NO.	PERCENTAGE	NO.	PERCENTAGE	
All cases	17	16	8	10	13·5
Under 2 years	15	23	8	14	19
Over 2 years	2	5	No deaths		3

From table 2 it will be seen that no particular type of pneumococcus was responsible for a majority of the seventeen fatal cases in group 1.

Summarizing these results it appears that pneumonia caused by any of the types of pneumococcus is more serious than that caused by other organisms. These figures show a striking improvement in the mortality rates compared with figures taken from similar material in the same hospital for the years 1928 to 1932. Fleming (1933) records that the death rates at that time were 45 per cent. for children under three years of age and 6 per cent. for those over three years of age. This improvement seems to have taken place since the routine use of sulphapyridine was instituted. This was started in 1938 and in that year the death rate for children under two years of age was the same as that found for the present series (19 per cent.). In other respects the treatment of the 1928 to 1932 cases was carried out on similar lines to that employed since 1938. Whether the improvement in mortality is entirely due to sulphapyridine treatment, it is impossible to say. Other factors, such as diminution in the virulence of the infection, may have played a part. It also appears that sulphapyridine is equally effective whether pneumonia is caused by the pneumococcus or by other organisms.

After results. After discharge from hospital the children were re-examined at fortnightly, monthly or three-monthly intervals (according to the severity of the illness). Recovery was complete in all cases, but in three (type 1, type 6 and type 22 pneumonias) resolution was slow though the child's general condition improved rapidly. With few exceptions, the causal pneumococcus

disappeared from the child's throat soon after the acute stage of the illness was passed. Five children still harboured the organism up to two months after complete recovery. Two of these had type 6 and three type 19 infections —the two types most frequently encountered in the present series and those universally regarded as being of frequent occurrence in the carrier state.

TABLE 2

TO SHOW THE TYPES OF PNEUMOCOCCI ISOLATED FROM THE SEVENTEEN FATAL CASES IN GROUP I

DISEASE	TYPE OF PNEUMOCOCCUS																	
	3	6	8	9	11	12	14	18	19	20	22	23	24	25	27	29	31	TOTAL
Pneumonia (uncomplicated) ..			1*		1	1		1		1*					1			5
Pneumonia and otitis media ..		2									1	2	1			1		7
Pneumonia and meningitis ..				1										1				2
Pneumonia, meningitis and otitis media									1									1
Pneumonia and peritonitis ..	1†						1†											1
Pneumonia and empyema (T.11) and otitis media (T.20 and 31) ..					1‡					1‡							1‡	1

* Double infection in 1 case: types 8 and 20.
† Double infection in 1 case: types 3 and 14.
‡ Triple infection in 1 case: types 11, 20 and 31.

Incidence of pneumococcal types in pneumonia. One interesting fact which emerges from the study of pneumococcal infections in the child is the frequency with which certain strains encountered in health are also found in disease (Cooper, Rosenstein, Walter and Peizer, 1932). This is in marked contrast to the findings in the adult where the strains (usually types 1 and 2) regarded as responsible for the production of disease in a majority of cases are not often isolated from healthy 'carrier' throats. All workers are agreed that the 'higher' types of pneumococci are often responsible for the pneumonias of childhood and that type-incidence is different in children under three years of age from that in those over that age.

Table 3 shows the types other workers have found to be most prevalent in the pneumonias of childhood. From it one may conclude that pneumococci, types 1, 6, 14 and 19, are the most usual organisms to be met with. Table 4 subdivides the results into the two age groups (under and over three years) and shows that type 14 is the organism most commonly found in children under three years of age and type 1 in children over that age. It should be noted that most of these results come from American sources.

TABLE 3

INCIDENCE OF PNEUMOCOCCAL TYPES: REPORTS OF OTHER WORKERS
ALL AGE GROUPS

OBSERVER	PNEUMOCOCCAL TYPES MOST FREQUENTLY ENCOUNTERED											
Auger	1	2							14	18	19	
Nemir, Andrews and Vinograd	1					6			14		19	
Friderichsen (1939)	1	2	3	4		6	7	8			19	23
,, (1940)	1		3			6	7				19	23
Cooper, Edwards and Rosenstein					5	6			14			
Bullowa	1		3	4	5	6			14		19	
Plummer, Raia and Shultz ..	1		3		5	6			14			
Reimann	1					6			14			

Fig. 2 shows the incidence of the different types of pneumococci isolated from the present series of one hundred and five cases of pneumococcus pneumonia and from twenty-three miscellaneous cases who did not have pneumonia, but from whom pneumococci were recovered from the upper respiratory tract or from some other part of the body. In all, two hundred and sixteen strains were recovered. It will be seen that types 6 (18·5 per cent.) and 19 (22 per cent.) were undoubtedly those most commonly encountered; together they accounted for 38·3 per cent. of all cases. The incidence of the various types in the present series corresponds closely with that found by Dr. K. J. Guthrie working in the same hospital and using the same methods in the investigation of a similar group of cases. Type 19, however, occurred almost twice as frequently in the present series as it did in Dr. Guthrie's. Type 14, cited as being of frequent occurrence by all American observers, is rare in either of the Glasgow series. In the present series, after types 6 and 19, types 1, 9, 11, 22, 23 and 29 in this order were the strains most often isolated. Types 28 and 32 were not met with.

No significant fact emerges from the correlation of pneumococcus types with age incidence. The types formerly included in group 4 were found scattered through all age groups and the 'higher' types were not confined to infants and young children. Type 1 infection occurred much more frequently in children over two years than in those under that age. The type 1 pneumococcus was recovered from only two children under two years and from eight older children. The only type 2 pneumococcus encountered was isolated from the throat of a child aged fourteen weeks. Type 6 was found in seventeen children under two as compared with nine over two years of age and type 19 in fifteen of the older and eighteen of the younger age groups.

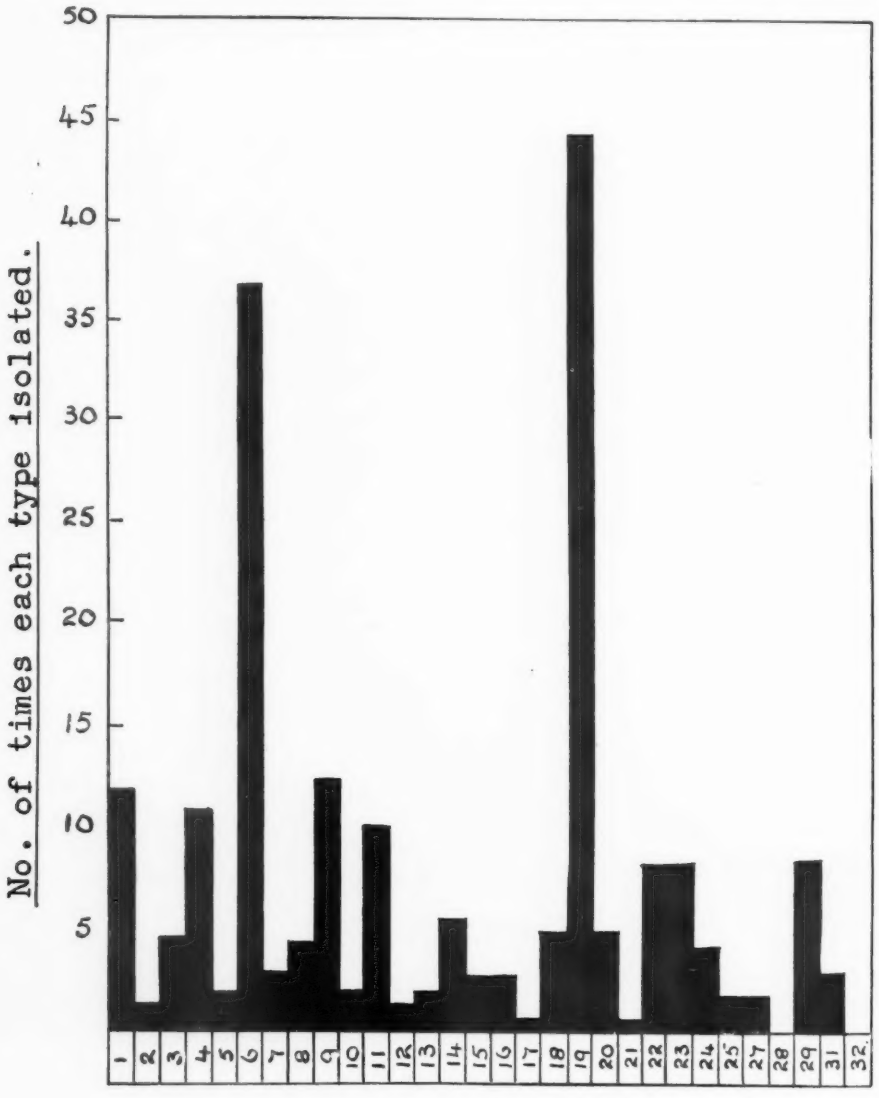
Incidence of pneumococcal types in miscellaneous cases. In this group of twenty-three cases there was no evidence of pneumonia. Table 4 shows the primary disease and the various pneumococcal types isolated. Only a few of these cases are worthy of special mention.

Of the two cases of meningitis the first occurred in a child of five years who was admitted to hospital with nephritis. She had had three previous attacks of pneumonia. Two weeks after admission she developed signs of meningitis and on lumbar puncture the cerebrospinal fluid yielded a growth of type 9 pneumococcus. She died four days later. Pneumococci were not isolated

from throat or nasal swabs. At post-mortem examination atelectasis was discovered in the left lung, tenacious non-purulent material in the bronchi, acute nephritis and meningitis. Culture of bronchial secretion and splenic tissue produced no bacterial growth. The other case of meningitis was caused

FIGURE 2.

To Show the Incidence of Types of Pneumococci.



by type 18 pneumococcus. The child was one year and four months old and showed no signs of lung involvement. The organism was cultured direct from the cerebrospinal fluid. No post-mortem examination was made. Treatment with sulphapyridine did not seem to influence the course of the disease.

TABLE 4

INCIDENCE OF PNEUMOCOCCAL TYPES UNDER AND OVER THREE YEARS OF AGE

OBSERVER	PNEUMOCOCCAL TYPES MOST FREQUENTLY ENCOUNTERED												
	UNDER 3 YEARS OF AGE					OVER 3 YEARS OF AGE							
Auger			14	19		1	2				14	18	19
Nemir, Andrews and Vinograd		6	14	19		1			6				
Friderichsen		6			23	1				7			
Bullowa			14			1							
Plummer, Raia and Shultz	3	6	14			1		5					
Reimann			14			1							

Of the two cases of arthritis one, a girl aged two years, with type 6 infection of the left ankle joint, also yielded the same organism from throat and nasal swabs, but there were neither clinical nor radiological signs of pneumonia. The other, an infant of four months suffered from a type 9 infection of an elbow joint. She made a good recovery after treatment with sulphapyridine without at any time showing signs or symptoms of a respiratory lesion or any evidence of the presence of a pneumococcus in the throat swab.

The case of conjunctival infection occurred in a four-day old infant. The infecting organism was a type 6 pneumococcus. A coliform bacillus was isolated from the culture of the throat swab.

TABLE 5

TO SHOW THE TYPE INCIDENCE IN THE MISCELLANEOUS GROUP OF CASES (PRESENT SERIES)

DISEASE	NO. OF CASES	PNEUMOCOCCUS ISOLATED
Bronchitis	5	Types 1, 8, 14, 20, and 8 and 20 together
Meningitis	2	Types 6, 18
Arthritis	2	Types 6, 9
Tonsillitis	8	Types 3, 6, 15, 19 (twice) and 8 and 14, 3 and 4, 15 and 19 together
Conjunctivitis	1	Type 6
Bronchiectasis	1	Type 19
Otitis media	2	Types 21 and 24
Peritonitis	1	Type 1

Discussion

The present investigation shows that pneumonia in childhood may be caused by almost any of the recognized types of pneumococcus. This is in agreement with the results of other workers. In the present series all the types, save 28 and 32, were shown to be responsible for the disease on one or more

occasions. Type 33 was not tested for as the specific immune serum was not available. Type 19, a type which others have not found to be a usual cause of the disease, was the organism most often encountered. This is probably due to the large number of infections caused by it in May and August. Next in order of frequency came type 6, an organism that other workers have also frequently isolated. Types 1 and 2 were only rarely found in children under two years of age.

In the majority of the cases the course of the illness was remarkably similar, though physical signs varied from case to case; in some they showed a lobar and in others a lobular distribution. No evidence, either from clinical or radiological examination, could be obtained to suggest that a particular type of illness with distinctive signs and symptoms was caused by any one strain of pneumococcus. No single type of pneumococcus seemed to be specially responsible for any one of the complications met with, except possibly empyema in which three of the six cases were infected with the type 1 organism.

The response to treatment with sulphapyridine may be considered satisfactory, and it is difficult to avoid the conclusion that the great reduction in the mortality is attributable to the use of the drug. It must be remembered, however, that the virulence of infecting organisms varies from time to time. Though the present series of cases was comparable in every way to that studied in the same hospital in the years 1928 to 1932 it is possible that in the period during which sulphapyridine was employed, the disease had assumed a milder form. The fact that in children the disease may be caused by almost any of the known types of pneumococcus against all of which sulphapyridine is effective gives this drug a greater practical value in treatment than serum, for the use of which special laboratory facilities are necessary.

Summary

1. One hundred and eighty-six cases of pneumonia have been investigated. One hundred and twenty-three or 66·4 per cent. of these occurred in children under two years of age.

2. The mortality rate was low. For children under two years it was 19 per cent. and for those over two years 3 per cent. Probably treatment with sulphapyridine was responsible for the low rate.

3. All the recognized types of pneumococci, save types 28, 32 and 33, were found on one or more occasions. Types 19 and 6 were the strains most frequently encountered. They accounted for 38·3 per cent. of the cases of pneumonia from which a pneumococcus was isolated.

4. Types 1 and 2 only occurred rarely in children under two years of age. Of the two types most frequently found (types 6 and 19) the former was evenly distributed between children under and over two years of age; the latter was relatively more frequently found in children over two years of age.

5. It was rare to find the causal pneumococcus persisting in the respiratory tract after the acute stage of the illness was over.

Thanks are due to Professor G. B. Fleming, to Dr. K. J. Guthrie of the Pathology Department, and to the clinical staff of the Hospital for much valuable help. Part of the expenses of the work was defrayed by a grant from the Medical Research Council. The sera for determining the pneumococcal types were kindly supplied by Messrs. Chas. F. Thackray, Ltd. The work was done during the tenure of a McCunn Scholarship.

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DEMENTIA INFANTILIS WITH CORTICAL DYSRHYTHMIA

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Dementia and the major psychoses are rare in children. Weygandt, in 1907, introduced the term dementia infantilis to describe cases of progressive mental deterioration of obscure causation, occurring in young children whose previous development had been normal. Since then many of the cases to which this description applies have been found to have a definite etiology in inflammatory, degenerative or demyelinating diseases of the nervous system. By common consent the term has come to be applied to the rather diverse clinical group of cases described originally by Heller (1908). Attempts have been made by Zappert (1921) and others to limit it to a circumscribed syndrome, but, as Voigt (1919) has pointed out, Heller's cases differed considerably from one another and may well have had a varying etiology. It is perhaps better, therefore, to regard dementia infantilis in a wider sense as a clinical grouping from which more circumscribed syndromes will continue to be split off as investigation proceeds. It is one of the objects of this paper to describe a case which conforms clinically to this group and in which electroencephalographic study has yielded a clue to the underlying pathological state. The type of abnormal cortical activity found in this case may well have been present in some of the cases previously described.

The clinical similarity between cases of the infantile dementia group in spite of a varied causation is not remarkable when it is considered that in general the kind of psychological disturbance seen in children in whom there is gross psychotic disturbance depends at least as much upon the stage of mental development at the time it occurs as upon the nature of the etiological process. It is probable for this reason that Heller's cases, whilst alike clinically, were

not of similar origin. The essential features of these cases were normal early development, onset at the age of about four, early interference with speech, stereotypies and stupor alternating with periods of motor restlessness. All terminated in a profound dementia. Heller specifically mentions the absence of convulsions and of gross abnormalities in the nervous system.

Some years later de Sanctis (1925) described a syndrome with many features in common with Heller's cases. To this he gave the name ' phrenasthenia aparetico-aphasica tardiva.' The essential difference was that this group had a slightly later onset and that some of the cases had convulsions. The clinical features, especially the catatonic behaviour, had much in common, not only with Heller's cases, but with the dementia praecocissima previously described by de Sanctis (1906, 1908) and by Constantini (1908, 1911). This latter group showed most of the features of catatonic schizophrenia, including mutism, stereotypies, echolalia and attacks of impulsiveness alternating with stupor. It is of interest that one of Constantini's cases showing this picture also had convulsions.

Clinically, dementia praecocissima occupies an intermediate position between Heller's dementia, as defined by Zappert (1921) and prepubertal schizophrenia, as described by Potter (1933) and by Lutz (1937). De Sanctis's phrenasthenia appears to have clinical features common to all three conditions, and was thought by that author to have an organic origin.

It is evident that clinical states in children in which catatonia and disturbances of psychomotor tempo accompanied by dementia are the main features are not specific and may indicate the presence of either a functional psychosis or of an organic deterioration of the nervous system. Lange (1933) records two cases which accord with Zappert's criteria but which were almost certainly due to chronic epidemic encephalitis. Cases of Schilder's disease starting elsewhere than in the occipital cortex, and of late amaurotic idiocy in previously normal children may show an exactly similar clinical picture. In other conditions of gross disease of the nervous system differential diagnosis is nearly always possible by reference to physical signs. The non-specificity of catatonic behaviour is further illustrated by its frequent occurrence in aments (Weygandt, 1907) and in the psychoses of aments (Earl, 1934).

There is little mention in the literature of the clinical behaviour of cases of epileptic dementia occurring in children of normal early development. This can only be because most cases occur in mentally defective or neurologically disabled children, and because most cases of dementing epilepsy in children are past puberty before the dementia reaches a severe degree. It seems not improbable that catatonic phenomena can occur in children in the later stages of epileptic dementia as they do at times in adults. Disorders of motility with hyperkinesis alternating with psychomotor retardation are common in the earlier stages, and these features are also present in some of the schizophrenia-like psychoses. Differential diagnosis between epileptic dementia and schizophrenic psychosis may not, therefore, be easy in the absence of a history of convulsions. It seems possible that in the instances recorded by de Sanctis and Constantini, in which fits occurred in a setting of infantile dementia, that the dementia may have been due to an epileptic state in which the fits were not frequent.

The application of electroencephalography has shown that much of the abnormal cortical activity characteristic of epilepsy occurs without demonstrable alteration in the individual's behaviour at the time the record is taken. The essential process in epilepsy is now seen to reside not so much in the convulsions but in the dysrhythmic state which is their background. Dementia is known to be at least as rapid in petit mal as in major epilepsy, and the possibility of epileptic dementia occurring in the total absence of demonstrable fits has now to be envisaged. The clinical features of such a dementia, as has been shown, might well be similar to those of the schizophrenia-like psychoses of children.

In the case to be described a previously normal child developed symptoms of the type described by Heller and by de Sanctis, but in the electroencephalogram showed a profound disturbance of the cortical rhythms. The diagnosis of epileptic dementia was confirmed after over a year by the appearance of actual convulsions.

Case report

The patient is a boy of eight years whose parents first sought advice two years ago because he had ceased in the course of four months to make progress at school, where he was formerly regarded as among the brighter pupils. At that time he spent long periods staring and grimacing and had wandered aimlessly away from school on a number of occasions.

FAMILY HISTORY. The parents are both of above average intelligence and show no gross neurotic traits. In the electroencephalogram, however, both gave abnormal records of the kind described by Lennox, Gibbs and Gibbs (1940) as frequently occurring in the relatives of epileptics. The patient is an only child. The father's brother stammers and has violent attacks of temper. The maternal grandmother was ' peculiar ' and her brother was an epileptic defective. The maternal great-grandfather was an epileptic dement and was certified at the age of thirty.

EARLY HISTORY. Normal pregnancy and delivery. Good progress in early months and no serious illness in this period. Began school at five and a half and was regarded by teacher as a particularly bright child. At six could print legibly, read simple phrases, add small sums of money and do simple mental arithmetic (e.g. 14+3, 9+4). He could do one-line compositions spontaneously, knew the primary colours and numerous shades and spent much time in drawing. He mixed well with other children, though a little timid, and was regarded as physically and mentally normal for his age.

PRESENT ILLNESS. The onset was gradual. Shortly after his sixth birthday he had a mild attack of whooping-cough and was kept away from school in order not to infect other children. On his return he was in excellent health, but his difficulty in learning was at once apparent. He appeared incapable of assimilating any new knowledge and became inaccurate and unreliable in using methods learned previously. He failed with simple sums and was unable often to remember material learned the day before, though able to sing songs learned a year before at home. He lost the ability to name shades of colour with any reliability, though still able to recognize the primary colours. He would stare vacantly before him and when addressed would repeat the speaker's words.

By the time he was six and a half his teachers regarded him as dull and quite ineducable, though they said he often gave inconsistently good answers which showed that he had been paying full attention though appearing to stare

vacantly. On one occasion, after his class-mistress had apparently been unable to explain a lesson to him, she found him explaining it accurately to some other children. Later he was unable to remember where to hang up his clothes, though knowing that he had to do so. He spent much of his time staring, grimacing and smiling to himself.

He walked out of school on several occasions and took buses to distant places where he was found stranded and unable to account for his actions. At home he alternated between stupor and excitement. In the latter phases he would run about tearing up papers, throwing things out of windows and being over-active, noisy and destructive. At night he had to be tied in bed by his parents, as he frequently got out and slept on the floor. He gradually became completely wet and dirty.

At this point, general measures having no effect, he was referred for a psychiatric opinion and diagnosed as schizophrenic. Attempts were made at a psychotherapeutic approach, but he was quite unco-operative. When seven and a half he suddenly fell down and was unconscious for half an hour. There was no tonic or clonic convulsion. He was sent to a neurologist, who referred him to one of us as a probable case of Schilder's disease. No abnormalities in the nervous system had been found.

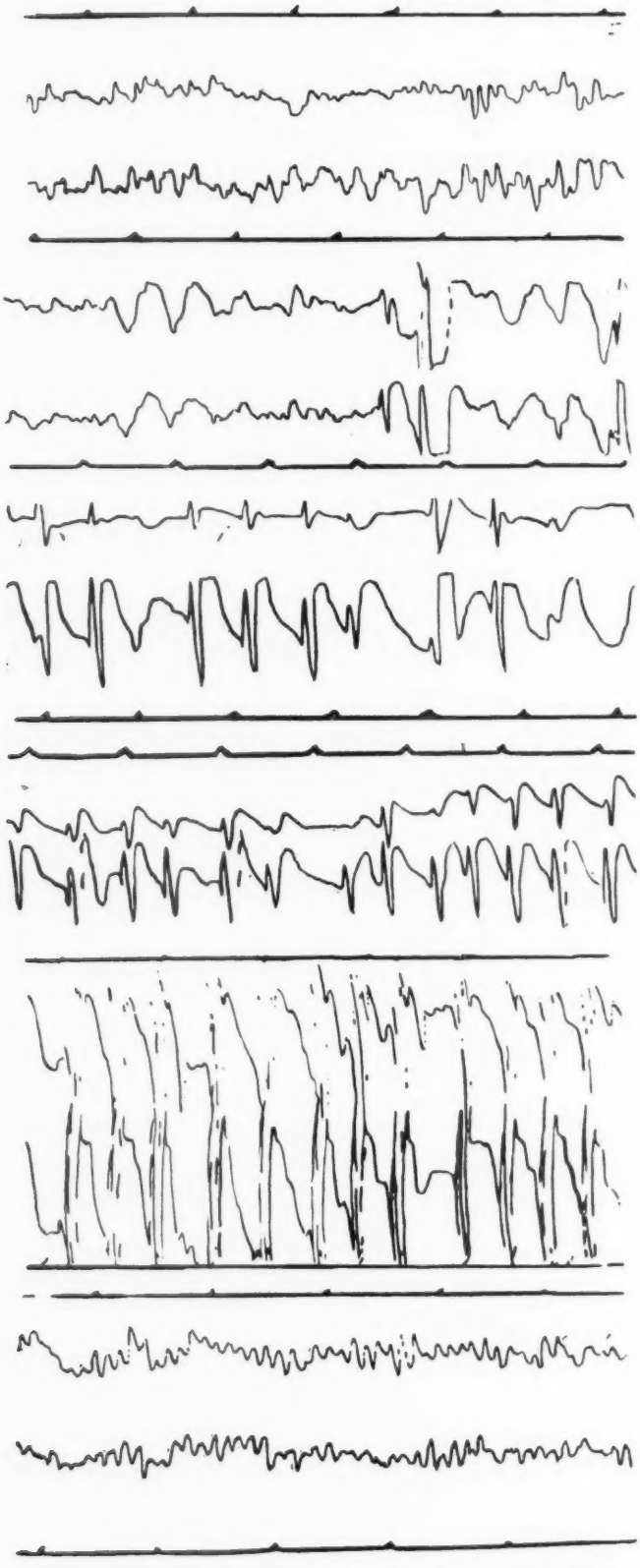
His deterioration had thus taken place over a period of eighteen months, and he has now been under observation for a further six months. Apart from the attack of unconsciousness described, no fits, major or minor, had been observed up to the time of admission.

Clinical state on admission. The patient was in a somewhat stuporose condition, but took notice if spoken to sharply and obeyed commands if repeated. His vision was evidently quite good. Echolalia was marked, each sentence usually being repeated once. Echopraxia was present in marked degree and he often showed flexibilitas cerea. He made grimaces at intervals and smiled and laughed to himself. At intervals he became over-active, climbing up to the windows, dancing on his bed and singing nursery rhymes. He was incontinent of urine and faeces. He sometimes resisted handling and attempted to bite. For the first month no petit mal attacks were observed, and there were no major convulsions.

On examination of the nervous system no abnormality was found and hearing and vision were proved to be within normal limits. An x-ray of the skull showed no abnormalities, the Wasserman reaction was negative in blood and cerebrospinal fluid, and the blood count was normal. The cerebrospinal fluid showed an initial pressure of 170 mm. on two occasions at three-month intervals. Cells were never over 3, and the protein was not increased.

Initial electroencephalogram findings. The apparatus used consisted of two independent channels of balanced input, special type low-frequency amplifiers recording on the smoked paper of a large Palmer kymograph (Golla, Graham and Walter, 1937). Bipolar leads were taken from silver electrodes with saline pads placed on widely separated areas of the cortex (Walter, 1937). On the first occasion when the electroencephalogram (E.E.G.) was taken, few alpha waves were seen from either hemisphere; these had, however, reached the lowest extreme of adult frequency at 8 per second. Low-amplitude 3 to 4 per second waves and bursts of 2 per second 'spike and wave' complexes were seen from all areas, but the delta wave disturbance had its origin chiefly in the frontal lobes, especially in the right side. The effects of hyperventilation could not be observed, through lack of co-operation, but the inhalation of CO_2 materially reduced the number of petit mal complexes.

Progress and response to treatment. The patient's progress was first observed for three weeks without drug therapy of any kind. Frequent E.E.G.'s showed marked changes from day to day, but these did not correlate to any



RECORD I: 9 per second waves (alpha rhythm) from the right hemisphere, and a run of 3–4 per second waves (delta rhythm) from the left hemisphere.

RECORD II: Delta waves of higher amplitude with random spike and wave complexes from both hemispheres.

RECORD III: Runs of spike and wave complexes with a frequency of 2 per second at a time when petit mal was not clinically discernible.

RECORD IV: The same as record III at slightly greater frequency.

RECORD V: Some weeks later: A run of spike and wave complexes with a frequency of 3 per second during an attack of clinical petit mal.

RECORD VI: 9 per second waves (alpha rhythm) from both hemispheres. The record improved greatly for a short time on anti-convulsants and ammonium chloride. This record was taken a few days before the onset of ketosis. There was no constant relationship between clinical and E.E.G. improvement.

In all the records the upper tracing is from electrodes placed on the right frontal and right occipital regions, and the lower tracing from electrodes placed on the left frontal and left occipital regions. The time marking is in seconds. The amplification is approximately the same in all records. To simplify printing the records have been reproduced here in black lines on white. The originals were white on black.

Records I, II, III and IV were taken prior to treatment with anti-convulsants.

extent with clinical changes, although a decrease in the amount of ' spike and wave ' complexes was possibly associated with a decrease of catatonic behaviour and an increase of spontaneity and responsiveness. Twelve hours' starvation induced a continuous series of ' spike and wave ' complexes lasting for over half an hour, but these, which were at only 2 per second, were not associated with clinical petit mal. Although the patient was mute and echopraxic, he would follow the investigator with his eyes, and obey forceful commands. Some weeks later, when clinical petit mal could be observed, the ' spike and wave ' complexes reached the normal adult frequency of 3 per second.

Benzedrine sulphate, in doses up to 40 mgm. per day, had no effect electrically, but lessened the hyperkinetic behaviour. Sodium diphenyl hydantoinate (epanutin), in doses up to 0·1 gm. t.d.s., produced a marked improvement in the E.E.G. in the sense that fewer delta waves (less than 6 per second) and an increase of alpha waves (8 to 13 per second) were seen. Petit mal complexes were almost abolished if the patient breathed CO_2 while receiving epanutin. The optimum effective dose of the latter was reached at 0·5 gm. t.d.s. and no further improvement in the E.E.G. resulted from higher dosage. In view of the effect of CO_2, the patient was then given ammonium chloride 20 grains t.d.s., and this produced a marked change in the record, and for minutes at a time no delta waves could be seen from any area. The petit mal complexes were also reduced in amount. There was, perhaps, a slight increase in spontaneity and responsiveness during this period, which was unfortunately terminated after ten days by the onset of ketosis.

The patient was under observation for a period of six months, but the investigation was interrupted on one occasion by scarlet fever, which was followed by a spontaneous clinical improvement and on another by the advent of three major epileptic fits, which were followed by a marked deterioration of his condition. Following these fits the patient had signs of a left hemiplegia, and the left pupil was larger than the right. These signs disappeared in three days. The first true clinical petit mal were observed by the nursing staff about one month after admission, and in such attacks he was unresponsive to any stimuli. Later clinical petit mal was observed during E.E.G. examinations, and it was remarkable that at such times the ' spike and wave ' complexes were always of greater frequency.

The impression gained was that the electrical record could be improved by drugs, but only at the increased risk of clinical fits. There was no evidence that lasting benefit in the mental condition or arrest in the progress of the dementia could be obtained.

Discussion

The mode of onset of the condition described and the clinical features present during the first year of its course fully justified at the time the diagnosis of dementia infantilis, if this term is used in the wider sense of Weygandt. In the echolalia, grimacing, stupor with flexibilitas cerea and outbursts of aimless and disconnected activity and incongruous laughter there was every reason to regard the clinical state as catatonic, and the underlying process as a schizophrenia-like one. Not only were abnormal physical signs in the nervous system completely absent until major epileptic attacks had occurred, but petit mal attacks could not be observed even at times when the electrical record was showing a continuous series of the ' spike and wave ' complexes associated with that condition. Without the aid of electroencephalography the diagnosis of dysrhythmic (i.e. epileptic) dementia could not have been made at all until

the appearance of major or minor attacks, neither of which was observed until eighteen months after the onset.

It seems reasonable to suppose that, apart from the aparetic-aphasic group of de Sanctis in which convulsions were usually present, some of the cases of schizophrenia-like psychosis in childhood (Lay, 1938) with catatonic behaviour described in the literature may actually have been cases of dysrhythmic dementia in which the disturbance of cortical activity was insufficient at any one time to cause outward signs in the form of epileptic attacks, and yet was present for a sufficient time to cause a rapid dementia. In the present instance there can be little doubt as to the diagnosis. Quite apart from the absence of raised intracranial pressure and of abnormal physical signs, except in the period following major fits, the variability of the abnormal waves, the changes produced in them by drugs, and the presence of the typical ' spike and wave ' complex practically excludes the possibility of a space-filling lesion or a degenerative process to which the dementia and the electrical disturbances might be secondary. It is generally agreed (Walter, 1938) that this complex is not found in such symptomatic convulsive states. Apart from the unusually long sequences of waves of petit mal type, the records obtained were typical of paroxysmal cortical dysrhythmia (Gibbs, Gibbs and Lennox, 1937) as seen in most cases of idiopathic epilepsy. In view of the finding of these workers (Lennox et al., 1940) that in 35 per cent. of cases of epilepsy the electroencephalographic records of both parents showed abnormalities, it is of interest that in this case both parents, although they were without symptoms or abnormal personality traits, showed unequivocal disturbances of the electrical record.

Many cases of schizophrenia-like psychosis in childhood, like the present case, exhibit hyperkinetic behaviour. Such behaviour is common in epileptic children. It is also seen in the type of child described by Jasper, Solomon and Bradley (1938), Lindsley and Cutts (1940) and Walter (1938), who presents a behaviour problem accompanied by an abnormal electroencephalographic record in the absence of convulsions. The type of record, however, bears little relation to the kind of behaviour abnormality. In the case described there was no clearly demonstrable relationship between the clinical and electrical states, and both hyperkinesis and stupor were accompanied by increased or decreased abnormal activity.

This case shows clearly that dysrhythmia of epileptic type can, in children, be accompanied by a typical catatonic as well as by an hyperkinetic state. Neither catatonia nor hyperkinesis can therefore be regarded as specific for any one kind of underlying pathology. The condition here found, to which the name dementia dysrhythmica infantum may be given, must therefore be added to the number of pathological states which may give rise to the clinical picture of dementia infantilis.

The electrical records were remarkable for the long periods of petit mal activity which were found. Series of ' spike and wave ' complexes continued for as long as thirty minutes without alteration, though such complexes were of slower frequency than that seen during petit mal fits. During some of these periods the patient showed no clinical abnormality, but later attacks of petit

mal were seen in relation to them, and then the ' spike and wave ' complexes reached the normal frequency.

Although treatment with sodium diphenyl hydantoinate produced both an improvement in the record and some clinical improvement, there seemed after six months no prospect of the patient's becoming educable.

Summary

A case of dementia with catatonic behaviour starting at the age of six is described, in which a marked cortical dysrhythmia was found on electro-encephalographic examination.

The clinical similarity between this case and the schizophrenia-like psychoses of childhood is discussed.

No definite relationship was observed between the abnormalities of electrical rhythm and the clinical state of the patient at the time of taking the records.

Abnormal electrical records were obtained from both parents.

Long series of repeated electrical complexes of petit mal type were recorded. Although these were of uniquely long duration, they were not accompanied by clinical attacks until the frequency of the complexes had risen to 3 per second.

It is suggested that some of the recorded cases of the dementia infantilis group may have been cases of epileptic dementia in which the dysrhythmia was present without outward clinical manifestation. The name dementia dysrhythmica infantum might be applied to this group.

Thanks are due to Dr. Louis Minski for permission to publish the above case.

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HOSPITAL DIARRHOEA

BY

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Institutional diseases, such as jail fever, hospital gangrene, and child-bed fever, have declined in importance. The same may be said of hospital diarrhoea, but it still affects thousands of children and kills hundreds of infants. The problem of its control has been reaccentuated by the use of emergency hospitals for children, and by the difficulty of getting for them nurses who are entirely adequate in numbers and training.

The problem is not clear-cut, for conditions vary widely, but a short account of the occurrence of diarrhoea, not due to purgation or obvious dietary indiscretions, in the children admitted to one such hospital may be interesting. An attempt has been made to classify the attacks epidemiologically, as this method is the most likely to help the planning of preventive measures.

The hospital has had a varying number of beds for adults and children, and the occupancy has fluctuated, particularly with season and with changes in policy. But generally there have been 110–130 beds for children, arranged in five nursing units, with five open wards of 18–25 beds. One unit also has an eight-bed and two two-bed wards; another has four sick-rooms for nurses in addition to a large ward for children.

Between Nov. 1, 1939 and Jan. 31, 1942 nearly two thousand children were admitted, and nearly a quarter of them were infants under two years old. There were 203 attacks of diarrhoea, starting after admission to hospital, and infants were affected over twice as often (proportionately) as older children (table 1). In addition, ten nurses had Sonne dysentery.

TABLE 1

ADMISSIONS AND ATTACKS OF DIARRHOEA FROM 1/11/39 TO 31/1/42

	ADMISSIONS	ATTACKS	ATTACK RATE PER 100 ADMISSIONS
Total	1926	203	11
Older children	1486	116	8
Infants	440	87	20

There was no striking seasonal incidence, though the summer months were fairly trouble-free.

The attacks were divided into epidemic (190) and sporadic (13). The epidemics were divided into ' food poisoning,' bacillary dysentery, and other outbreaks (fig. 1). From fig. 2 it may be seen that the infants had no special liability to food poisoning or dysentery, but that the other outbreaks and the sporadic cases were almost confined to infants less than two years old.

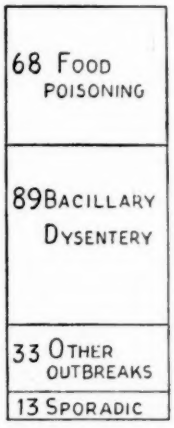

FIG. 1.—Types of diarrhoea developed by children in hospital.

Food poisoning

Outbreaks were thought to be due to ' food poisoning ' when a number of patients were afflicted with diarrhoea almost simultaneously. The illness was acute and transitory, being over in a few hours; it was sometimes distressing, but did not produce severe illness; vomiting was rare, pyrexia absent; some children complained of abdominal pain; mucus, blood, and pus were not seen in the stools, and no pathogenic organisms were grown from them. Adults as well as children were affected.

Two outbreaks, affecting 49 of the hospital children, were traced to the consumption of minced meat, although meat cut from the same joints, but not minced, was innocuous. The mincing machine was looked after by a mentally defective kitchen worker and, although it was supposed to have been thoroughly cleaned, it was found on one occasion to contain a large crumb of minced meat from the previous day's supply. Chemical changes could be produced in such a pabulum by the activity of ordinarily non-pathogenic organisms (see Topley and Wilson, 1936), and the toxins would be mixed with part of the next day's mince. This was put in an oven to keep warm for half an hour before being sent to the wards, and further changes might take place during this incubation.

Bacillary dysentery

This group consists of patients who acquired dysentery, shown bacteriologically to be due to Sonne bacilli, in hospital, and also those patients who developed diarrhoea, with negative stool cultures, in the same wards at the same time as the proved cases. This may have caused the inclusion of a few

non-dysenteric patients, but from analysis of the symptoms in the stool-positive and -negative groups I do not think any large error has been introduced.

The outbreaks varied in size; in all there were five outbreaks affecting 10 nurses and 89 children. Infection was often brought into the hospital by children who were admitted with the disease, but the largest epidemic followed a primary case in a nurse, who may have been infected in her billet. The condition spread from individual to individual, and not by food-contamination. On two occasions the epidemic got really out of hand, spread to other wards, and affected over 40 people before coming under control.

Why should it be so difficult to prevent an obviously preventable disease? Several reasons spring to the mind:

1. The diagnosis may not be made early enough; e.g. a boy was admitted with abdominal pain and tenderness, pyrexia and vomiting. His appendix was removed and he was back in the ward just in time to start having diarrhoea, blood and mucus being seen in the stools the next day. Again, a patient was transferred from one ward to another; she had slight frequency and looseness of the stools, but no particular attention was paid to them; a week later a patient in the second ward developed frank dysentery; Sonne bacilli were then found in the faeces of the first patient.

2. The disease is mild, and may be undetected, particularly in nurses. One child who was said to have had only one loose stool excreted dysentery bacilli for a month. Both convalescent and healthy temporary carriers may be encountered.

3. Children with dysentery often become incontinent and pollute the bed clothes instead of defaecating tidily into a chamber. If several children have dysentery at the same time the strain on the nursing staff is considerable.

4. In England dysentery is usually mild, and precautions against its spread are often not carried out as rigorously as in typhoid fever, for example. Yet it is known that the Sonne bacillus can kill infants (see, for instance, the account of Nabarro and Signy, 1932).

5. Many bacteriologists have been slow to use improved methods of detecting the organisms, and many paediatricians slow to insist on the bacteriological evidence of freedom from infection which they would require in typhoid fever. Table 2 shows that a minority of patients excrete Sonne bacilli for some weeks, although the diarrhoea only lasts for a few days, and also that one negative stool culture does not preclude the possibility of continued infection.

TABLE 2

STOOL CULTURES IN PATIENTS WITH SONNE DYSENTERY

90 had stools cultured twice or more					
57 had positive cultures					
54 were positive in the	1st	week			
26	,,	,,	,,	2nd	,,
4	,,	,,	,,	3rd	,,
1	,,	,,	,,	4th	,,
2	,,	,,	,,	5th	,,
10 had a positive culture after one negative					
3 had a positive culture after two negative					

In this hospital the infection was introduced into an uncontaminated ward eighteen times, and secondary cases followed on nine occasions. In four of these there was evidently a failure in the technique of isolation of a known patient; in two the diagnosis was not made promptly enough; in one a nurse was allowed to go back on duty only a week after ceasing to have diarrhoea, and when only one negative stool culture had been obtained; in two no source of infection was discovered, and undiagnosed infection in the nurses seemed likely.

Other outbreaks

The other outbreaks of diarrhoea were small and almost restricted to infants (fig. 2), who were in many instances underweight, though some were

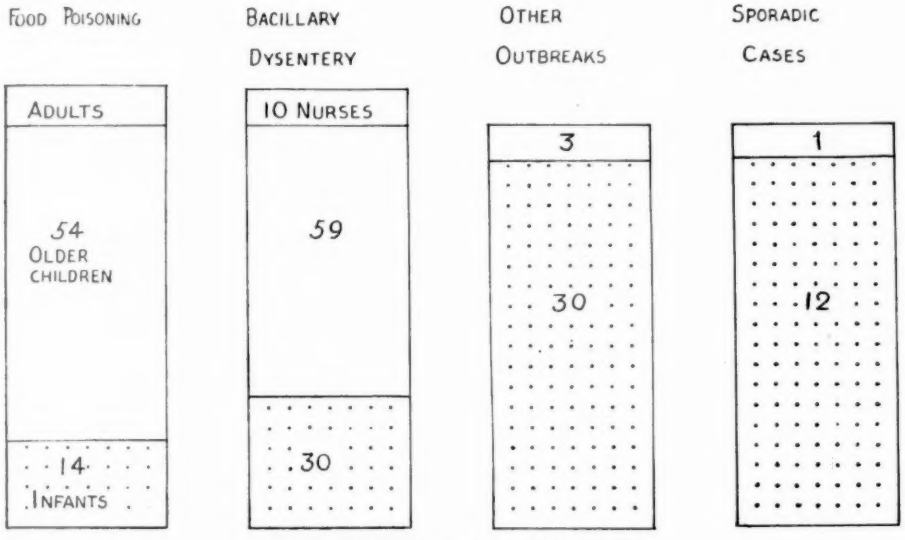

Fig. 2.—Diarrhoea in relation to age.

excellently nourished. The illness was usually mild, consisting of diarrhoea, often with the passage of mucus but no blood or pus; at times the illness was severe, with vomiting, dehydration and pyrexia—in short, ' D. and V.' No pathogenic organisms were discovered in the stools, and the food was not to blame, for infants on different varieties of milk were affected alike.

In the seventh outbreak, two of the affected infants had acute otitis media, and other evidence of respiratory infection was sought. It was found, when looked for, in each outbreak (table 3, no. 6 to 10). Although the infants with diarrhoea often had no sign of acute respiratory illness, the older children were usually suffering simultaneously in a ward epidemic of influenza, sore throat, or common cold (see fig. 3). The importance of parenteral, especially respiratory, infection in causing ' gastroenteritis ' is well known, but it would appear that the signs of respiratory infection must sometimes be sought in the older children rather than in the infants with diarrhoea.

TABLE 3

OTHER OUTBREAKS OF DIARRHOEA

OUT-BREAK	DATE	NO. AFFECTED		RESPIRATORY DISEASES IN:	
		INFANTS	OLDER CHILDREN	CHILDREN WITH DIARRHOEA	OTHER CHILDREN
1	1938 Dec.	5	0	—	?
2	1939 Dec.	2	0	—	?
3	1939 Dec.	7	0	—	?
4	1939 Dec.	2	0	—	?
5	1940 Jan.	0	2	—	?
6	1940 Mar.	2	0	0	10 had influenza
7	1940 Apr.	4	0	2 had otitis	?
8	1940 Oct.	2	0	Both had bronchitis	0
9	1940 Nov.	2	0	0	4 had respiratory infection
10	1941 Feb.	4	1	1 rhinitis 1 pharyngitis	5 had respiratory infection, 2 had unexplained pyrexia

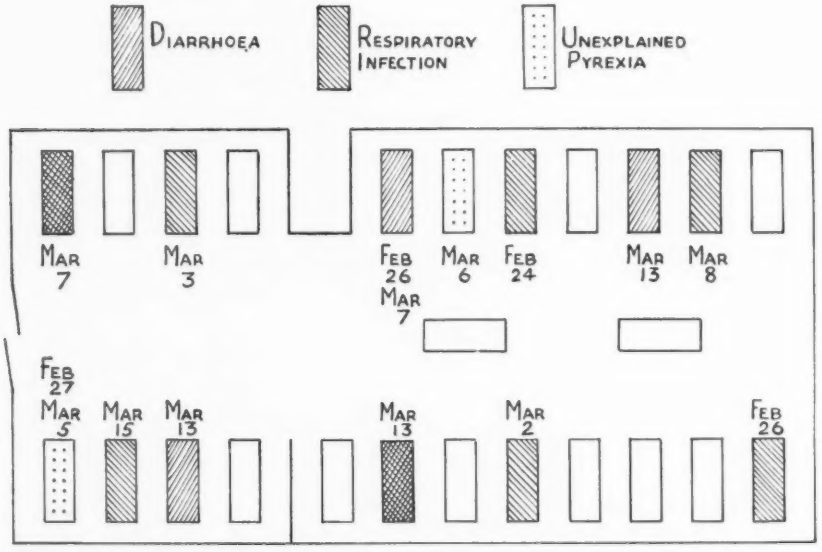

FIG. 3.—Plan of ward showing incidence of respiratory infection and diarrhoea, Feb.–March, 1941.

Sporadic cases

The smallest group consists of the children who developed non-epidemic diarrhoea, but it is important. There were six children over a year old in this group, and all survived, but of the seven under a year old, six died.

The illness was, therefore, often severe; it was often associated with vomiting and pyrexia; blood and pus were absent from the stools, which contained no pathogenic organisms; dehydration was apparent in the severe cases. This was, then, also typical ' D. and V.'

From table 4, certain features may be seen to be common to these patients: they were young, and a parenteral infection was often present. Only one was

not underweight before the development of diarrhoea, and he (case 4) had infantile eczema, which notoriously predisposes to digestive disturbance.

TABLE 4

SPORADIC CASES OF DIARRHOEA

CASE	AGE IN MONTHS	PRIMARY DISEASE	COMPLICATION AT TIME OF DIARRHOEA	WEIGHT / WEIGHT FOR AGE	SEVERITY
1	2	Lipoid pneumonia, wasting	Bronchitis	0·8	Fatal
2	3	Wasting: ? tuberculosis	Otitis media	0·6	Moderate
3	4	Pemphigus; wasting	Otitis media	0·5	Fatal
4	6	Eczema	—	1·0	Fatal
5	7	? Pylorospasm	Pyaemia	0·7	Fatal
6	7	Congen. heart disease	Pyuria	0·6	Fatal
7	8	Pyuria; otitis media	Pyuria (recurrence)	0·7	Fatal
8	15	Unresolved pneumonia	—	0·8	Mild
9	17	Nutritional anaemia	Acute cervical adenitis	0·7	Moderate
10	18	Bronchitis; otitis media	—	0·9	Mild
11	20	Nutritional anaemia	—	0·9	Mild
12	21	Pink disease	Measles	0·8	Severe
13	36	Bronchitis	—	0·9	Mild

Prophylaxis

This survey has not shown the existence of any mysterious ailment of unknown origin. There are mysterious outbreaks—for example, neonatal diarrhoea—but enough is known to make possible the prevention of many attacks. This is not the place for a detailed programme of prophylaxis, for that must be worked out independently for each hospital. Measures must not, however, be taken against only one type of 'gastroenteritis'; many points must be considered: for example, sterilization of feeds and feeding-bottles, disposal of excreta, improved bacteriological methods in bacillary dysentery, the health of the nurses, alertness and awareness of nurses and doctors, isolation, air sterilization, masks, and the prompt diagnosis of urinary infections in infants.

Summary

Epidemics of diarrhoea are all too common in children's hospitals, and epidemiological classification can point the way to prophylaxis. In one hospital the outbreaks could be divided into attacks of 'food poisoning,' of Sonne dysentery (which is difficult to control for a variety of reasons), and of diarrhoea affecting infants but probably due to infections which cause respiratory infection in older children. In addition there were sporadic attacks affecting malnourished infants, who often had parenteral infection. Many of these sporadic attacks ended fatally.

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MICRO-METHOD FOR THE ESTIMATION OF THE SEDIMENTATION RATE OF RED CELLS

BY

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Although there are already many macro-methods in vogue for the estimation of the sedimentation rate of the red cells of the blood, the finger-prick methods so far reported do not appear to receive widespread application owing to a certain lack of confidence in the reliability and accuracy of the results obtained thereby.

The micro-method described below has at least one obvious advantage in that the 0·3 c.c. of blood used, reasonably easily obtained by capillary puncture, is accurately measured in a graduated pipette, instead of counting drops of blood the size of which may vary with their pathological consistency.

The method was tried in cases of rheumatism, rheumatic carditis, chorea, and allied conditions in childhood, thus obviating for these young patients a series of venupunctures by which to check and control the improvement or otherwise of their clinical condition.

Apparatus required

1. Special capillary blood pipettes graduated at 0·04 and 0·1 c.c.
2. Special micro-sedimentation tubes graduated in 50 mm. divisions, the cubic capacity of the graduated portion being less than 0·25 c.c. and the height of the tube being 70 mm.
3. Ordinary small test tubes for receiving blood and mixing with citrate.
4. Ordinary capillary tubes with a rubber teat attached.
5. 5 per cent. sodium citrate solution.

Method

The sodium citrate solution is drawn up into the blood pipette three times, and the last time 0·04 c.c. is delivered into one of the small test tubes. Blood is then drawn up into the pipette to the 0·1 c.c. mark three times, and each time is expelled into the small tube containing the 0·04 c.c. citrate, and is very thoroughly mixed to prevent formation of clots.

The mixture is then carefully drawn up into a capillary tube and is expelled into the micro-sedimentation tube without the formation of bubbles. The sedimentation tube is then placed vertically and readings are taken at half an hour and one hour exactly.

Sixteen normal cases were investigated and from the results the normal reading for the half-hour varied from 0 to 5 mm., and for the one hour, readings varied from 1 to 10 mm.

NORMAL CASES

PATIENT	HALF-HOUR	ONE HOUR	PATIENT	HALF-HOUR	ONE HOUR
	mm.	mm.		mm.	mm.
1. O. T.	1·0	2·0	9. F. L.	5·0	8·0
2. R. G.	2·0	8·0	10. F. F.	0·0	1·0
3. D. R.	2·0	6·0	11. V. S.	1·0	1·5
4. D. G.	3·0	9·0	12. V. H.	2·0	4·5
5. M. R.	3·0	7·0	13. E. D.	5·0	7·5
6. D. H.	1·0	8·0	14. R. T.	1·0	2·0
7. D. D.	2·0	3·0	15. D. B.	2·0	4·0
8. D. B.	2·0	6·0	16. B. C.	3·0	5·0

Thirty-four cases of acute rheumatism, rheumatic carditis, erythema nodosum, chorea and arthritis, were tested and gave the following results:

		1ST WEEK		2ND WEEK		3RD WEEK	
		½ HOUR	1 HOUR	½ HOUR	1 HOUR	½ HOUR	1 HOUR
		mm.	mm.	mm.	mm.	mm.	mm.
E. W.	Acute rheumatism	25·0	30·0				
E. T.	,, ,,	22·0	26·0				
D. M.	,, ,,	11·0	18·0				
I. H.	,, ,,	16·0	22·0				
D. I.	,, ,,	11·0	28·0				
E. T.	,, ,,	17·0	23·0	13·0	19·0		
E. W.	,, ,,	9·0	16·0	8·0	12·0		
B. B.	,, ,,	15·0	20·0				
A. G.	,, ,,	26·0	28·0				
I. G.	,, ,,	8·0	14·0				
E. N.	,, ,,	13·0	23·0	25·0	29·0		
O. T.	,, ,,	12·0	18·0	6·0	12·0	1·0	2·0
F. L.	,, ,,	8·0	14·0	5·0	8·0		
L. M.	,, ,,	5·0	11·0				
D. N.	,, ,,	8·0	15·0				
E. F.	,, ,,	9·0	15·0	12·0	20·0		
D. R.	,, ,,	20·0	28·0				
E. N.	,, ,,	6·0	10·0				
D. T.	,, ,,	23·0	28·0				
E. F.	,, ,,	23·0	28·0	5·0	15·0		
D. S.	,, ,,	28·0	30·0				
E. S.	,, ,,	12·0	24·0				
V. H.	Chorea	11·0	18·0	12·0	18·0	5·0	11·0
R. C.	,,	11·0	15·0	5·0	11·0	3·0	10·0
B. Y.	,,	18·0	23·0				
D. D.	,,	4·0	10·0				
J. C.	Erythema nodosum	10·0	15·0				
E. B.	,, ,,	19·0	24·0	15·0	20·0		
D. E.	,, ,,	15·0	18·0				
D. T.	,, ,,	15·0	21·0				
D. B.	Rheumatic carditis	8·0	15·0				
I. P.	,, ,,	5·0	13·0				
E. F.	,, ,,	12·0	26·0				
I. H.	,, ,,	8·0	12·0				

In ten of these cases the sedimentation rates were repeated at weekly intervals, and the results obtained agreed with the clinical course of the disease.

A further series of tests were carried out on placental bloods, in order to see whether the pregnancy high sedimentation rates were reproduced in the blood of the newly-born. In eight specimens of placental blood and in two specimens of blood from normal babies only a few days old, no increases in the sedimentation rate were observed.

Summary

It has been shown that:

(*a*) Normal readings are 0 to 5 mm. for half an hour, and 0 to 10 mm. for one hour.

(*b*) Moderately acute cases give readings of 8 mm. for half an hour and 14 mm. for one hour.

(*c*) Gravely acute cases give readings of 20 mm. for half an hour and 30 mm. for one hour.

Thanks are due to Dr. W. Gaisford, F.R.C.P., late of this hospital, for his permission to carry out these tests on selected cases from his childrens' wards, and to the nursing staff of these wards for their assistance and co-operation in obtaining the necessary specimens. Thanks are also due to Mr. Wentworth Taylor, F.R.C.S., for permission to obtain specimens from the maternity wards.

SOME SOCIAL ASPECTS OF INFANT FEEDING

BY

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This investigation was originally undertaken in an attempt to discover if there was any social difference in breast feeding in various parts of the Borough of Ilford.* Later the scope was widened to include an effort to find out if the stress of air-raids made any difference, and, finally, to corroborate other work that has shown the gradual decline in breast feeding that has taken place since the war of 1914–18, and its relation to the progressive development of infant welfare centres.

The method used was to classify the information given on the cards that are filled in by the health visitors employed by the borough on their routine visits. This meant that the type of feeding in the first fortnight or three weeks could not be considered as the health visitor does not call until after that period. The details relating to this visit are called ' first visit figures.' The method has the disadvantage that a certain unknown error occurs as a result of incorrect or equivocal filling in of the cards by the health visitor, sometimes due to misinformation on the part of the mother. As an example of this, the misuse of the term ' weaning ' might be cited. Instead of being used to denote that the infant was being taken off the breast, it was found by perusal of the cards that often the term meant that the infant was being put on to a mixed diet, either from the bottle or the breast. All information that was thus equivocal had to be discarded. The details relating to the sixth month was also investigated, and called the ' sixth month figures.' As the information on the cards is less definite at six months than on the first visit, much of the information could not be used, hence the ' sixth month figures ' are always based on smaller numbers than the ' first visit figures.' For example, the nurse might not visit on the sixth month or the parent might not be at home then. If, by way of illustration, the information showed that dried milk was being used on the fourth month, and also on the seventh month, then it might safely be deduced that a similar type of feeding was in use on the sixth month. On the other hand, if the fourth and seventh months showed different methods of feeding, this information could not be used. An advantage of the method, however, is that there is no selection, as every infant in the borough is visited, with, I believe, the sole exception of the children of medical practitioners !

* A borough in Essex, on the outskirts of London, largely of ' dormitory ' type.

To demonstrate the well-known decline in breast-feeding that has taken place, the earliest available cards were examined. These related to the year 1920. There were few of these cards, and only 136 could be used, although there were 1666 births in the borough in that year. In order to get figures that might be statistically significant the figures of 1920, 1921, 1922, 1923 and 1924, with 136, 138, 184, 255 and 455 cards respectively were added together, to get a more significant total of 1168 to compare with later years. For comparison the years 1930 and 1938 were chosen, the latter year being the last full normal period before the onset of the present war. These figures naturally relate to a period before the introduction of the national milk schemes.

FEEDING AT FIRST VISIT

(Percentages in brackets)

	Breast	Dried	Liquid	Condensed	Complementary or Supplementary	Total
1920–24	1014 (87)	47 (4)	18 (1·5)	53 (4·5)	36 (3)	1168
1930	1537 (87)	66 (4)	23 (1)	60 (3)	86 (5)	1772
1938	793 (73)	183 (17)	18 (1·5)	18 (1·5)	81 (7)	1093

The table shows a decline of 14 per cent. from 87 per cent. breast-fed children in 1920–24, to 73 per cent. in 1938. It will be noted that the decline began after 1930. The place of breast milk was taken by dried milk. A drop in the use of condensed milk and a rise in complementary or supplementary feeding of little statistical significance will be noted.

FEEDING AT SIX MONTHS

(Percentages in brackets)

	Breast	Dried	Liquid	Condensed	Complementary or Supplementary	Total
1920–24	372 (58)	116 (18)	41 (6)	75 (12)	33 (6)	637
1930	721 (63)	246 (22)	78 (7)	65 (6)	28 (2)	1138
1938	387 (44)	387 (44)	71 (8)	19 (2)	16 (2)	880

Once again the drop in breast feeding is noted, again of 14 per cent. from 58 per cent. in 1920–24 to 44 per cent. in 1938. The drop did not begin until after 1930. The place of breast feeding was taken by dried milk, the percentage of each in 1938 being identical, 44 per cent., but the consumption of condensed milk showed an appreciable decline, from 12 per cent. to 2 per cent.

The problem may be approached from another angle, that of the duration of breast feeding. The exact time of weaning could not always be ascertained from the cards, as often the particulars were concerned with the details relevant

at the time of the visit only. This difficulty was tackled, perhaps in a rather awkward fashion, by calculating the percentage of those breast-fed at six months who were still breast-fed at ten months or over.

	Breast-fed at Six Months	Wholly or Partially Breast-fed at Ten Months or over	Percentage
1920–24	405	146	36
1930	749	120	16
1938	403	24	6

It will be seen from these figures that the duration of breast feeding has diminished in a more dramatic fashion than has the incidence at birth and at six months. This is in accordance with common experience, for it is rare in Ilford to find a mother who breast feeds her child beyond nine months, whereas it appears from the earlier cards that it was then not unusual to find a child still breast-fed at eighteen months.

How do these figures compare with those given by Spence (1938) ? As Spence remarks, the form of the particulars differs from investigator to investigator; furthermore, the figures relating to any single community in different years are not identical. Also, as will be shown later, there are social differences to be considered, and the fact that statistics from infant welfare centres cannot be compared with those obtained from domiciliary visits. Thus only a very rough comparison is valid. These results agree in that from 20 per cent. to 30 per cent. of children are bottle-fed from birth, but Ilford differs from the North in that 44 per cent. in 1938, and perhaps even more in 1940–41 (see below) are breast-fed at six months. (Spence states that not more than one-third of mothers breast feed their babies at this age.)

Other considerations

In view of this decrease in breast feeding it is interesting to compare various other changes that have taken place in the same period. These details have been calculated from statistics given in the Annual Report of the Medical Officer of Health. The first is the increased use of infant welfare centres. As the town has grown greatly since 1920 it is misleading to point to the increase in the number of, and attendance at, clinics. A more valuable figure will be the ratio of births to new attendances at clinics during the year. Thus in 1920 for every 100 children born in the borough there were 53 first attendances at centres. In 1938 for every 100 births there were 109 new attendances. (The fact that there were more first attendances than births is explained by the rapid growth of the borough, with an influx of children from elsewhere.) Furthermore, in 1920, each child attended on an average fourteen times during the year, whereas in 1938 each child came twenty-two times. Might this, and the

fact that cheap dried milk is obtainable at the centres be the main cause of the decline in breast-feeding? This is very doubtful, for each child in 1920 obtained on an average 20 lb. of dried milk at the clinic and only 11·3 lb. in 1938. It is possible that there may be a statistical error in this calculation, as, if there were a larger proportion of toddlers in 1938 as compared with 1920 the amount sold per child would be smaller, since toddlers do not require dried milk. I have no reason to suppose that there might be such an error, but cannot suggest any way of disproving it. As 'toddlers' clinics' were started early in 1938, and an attempt made to dissuade mothers from bringing their toddlers to the ordinary clinics, there might have been on the other hand a smaller proportion of older children in this year. Another picture might be constructed, by the fact that in 1920, for every child born in the borough, 10·5 lb. of dried milk were supplied, whereas the figure in 1938 was 12·3 lb.; but this figure does not disclose, as has just been shown, that in 1938 the clinics were more than twice as popular as in 1920, and probably means that the extra 1·8 lb. per child per year was purchased at the clinic instead of at the chemist. The distribution of condensed milk and free liquid milk has not been considered, for, as demonstrated earlier, the place of the breast has been taken by dried milk.

The other interesting feature is the decline in the infant mortality rate from 54 per 1000 live births (1920) to 36·7 (1938). It is a fascinating paradox that although nearly all are agreed that breast-feeding is superior to bottle-feeding as far as the health of the child is concerned, yet, when communities become more civilized bottle-feeding increases and the infant mortality rates decrease. No doubt the infant mortality rate is highest in communities where breast-feeding approximates to 100 per cent. Other factors are doubtless responsible for this apparent discrepancy.

In order to discover if there were any social differences in breast-feeding, two districts in Ilford of widely differing economic status were compared. One (called W.A.) is mainly a middle or lower middle class district. This might be demonstrated by the fact that in 1938 no dried milk was given free to any parent attending the clinic that serves the district. The other area (called I.L.) is mainly a working class district and 551 lb. of dried milk were given free to necessitous families at the district clinic during 1938. To obtain figures large enough to be of value the cards for the six years 1935–1940 were compared.

FEEDING AT FIRST VISIT

(Percentages in brackets)

	Breast	Dried	Liquid	Condensed	Complementary or Supplementary	Total
W.A.	549 (79)	89 (13)	3	7 (1)	48 (7)	696
I.L.	487 (79)	72 (12)	3 (0·5)	4 (0·5)	52 (8)	618

There was thus no significant difference at the first visit between the two districts.

FEEDING AT SIX MONTHS

(Percentages in brackets)

	Breast	Dried	Liquid	Condensed	Complementary or Supplementary	Total
W.A.	288 (51·5)	230 (41)	30 (5·5)	3 (0·5)	8 (1·5)	559
I.L.	171 (41·5)	201 (49)	16 (4)	18 (4·5)	6 (1)	412

From this table it will be seen that there is a greater decline in breast-feeding at the age of six months among the poorer mothers than there is among the better off. In both districts the percentage of mothers breast feeding their children at six months who still feed them at ten months or over is negligible, i.e. 2 or 3 per cent.

I have often felt that the poorer class mother, although she began breast feeding her baby as enthusiastically as the better-off parent, did not continue as well. Further facts regarding infant feeding were collected from the mothers attending the clinics of these districts. These numbers are naturally small (there were fifteen such clinics per week at that time in Ilford), but as the bottle feeding section of the community tend to gravitate to clinics for obvious financial reasons, these figures show up particularly well the tendency of the overworked and underfed working class mother to take the easier path and accept the amenities of free or cheap milk.

FEEDING AT CLINIC—FIRST VISIT (1938)

	Wholly Breast	Bottle	Complementary or Supplementary	Total
W.A.	90 (66)	31 (23)	15 (11)	136
I.L.	53 (71)	15 (20)	6 (9)	74

From this table it will be seen that the percentage of breast-feeders attending the clinic is less than the percentage in the district as a whole. (The difference between the two districts is not statistically significant).

FEEDING AT CLINIC—SIX MONTHS (1938)

	Wholly Breast	Bottle	Complementary or Supplementary	Total
W.A.	39 (37)	59 (56)	7 (7)	105
I.L.	19 (26)	48 (67)	5 (7)	72

These numbers are small, but in each case the percentage of breast feeders at the clinic is about 15 per cent. less than in the corresponding district, and at six months is 11 per cent. less in the poorer district clinic than in the better off

one. It appears that the degree of breast-feeding depends largely on prevailing social habit, and any individual practitioner can do little to change the tendency. The same medical practitioner (the author) attended both these clinics. This social difference prevails in spite of the fact that breast feeding is both cheaper and easier than bottle feeding. These figures also show that it is fallacious to accept the type of feeding at an infant welfare centre as evidence of the condition prevailing in the surrounding community.

Air-raids

In order to determine whether the stress of air-raids had any effect on the type of feeding the cards of babies born from April 1940 to March 1941, inclusive, were investigated. As there has been a considerable and irregular movement of the population during the period under review, it cannot be guaranteed that all these mothers and babies experienced the stress of heavy air-raids; if they did not, they were under the strain of evacuation. Their whereabouts, unless actually at home in Ilford on the occasion when the nurse called, are not necessarily stated on the cards. From careful perusal of 200 unselected cards it was apparent that 163, or 81·5 per cent. were at least on one occasion in Ilford during the months of heavy air-raids from August 1940 to March 1941, inclusive.

FEEDING AT FIRST VISIT

(Percentages in brackets)

	Breast	Dried	Liquid	Condensed	Complementary or Supplementary	Total
1938	793 (73)	183 (17)	18 (1·5)	18 (1·5)	81 (7)	1093
1940–41	608 (71)	144 (17)	10 (1)	8 (0·5)	81 (9·5)	851

FEEDING AT SIXTH MONTH VISIT

(Percentages in brackets)

	Breast	Dried	Liquid	Condensed	Complementary or Supplementary	Total
1938	387 (44)	386 (44)	71 (8)	19 (9)	16 (2)	880
1940–41	276 (46)	260 (43)	53 (9)	1	11 (2)	601

This evidence suggests that the heavy air-raids have had little effect on breast-feeding, except perhaps that the decline seems to have been stayed at the sixth month period.

Complementary and supplementary feeding

A small but nevertheless very steady increase in partially breast-fed infants is to be noted at the first visit of the nurse.

	Partially Breast-fed	Total	Percentage
1920–24 ..	36	1168	3
1930	86	1772	5
1928 ..	81	1093	7
1940–41 ..	81	851	9·5

This rise compensates to a small extent for the decline in wholly breast-fed infants, as the following table will show.

	Wholly Breast-fed (Per cent.)	Partially Breast-fed (Per cent.)	Wholly and Partially Breast-fed (Per cent.)
1920–24 ..	87	3	80
1930 ..	87	5	92
1938 ..	73	7	80
1940–41 ..	71	9·5	80·5

The value of this type of feeding is difficult to assess. If it is the first step toward early weaning it should be discouraged, but, on the other hand, if it means that infants who would otherwise be completely bottle fed receive some breast milk it should be encouraged, and complementary feeding may tide mother and child over a difficult period when breast alone does not seem to satisfy the infant.

Summary and conclusions

1. (a) A decline in breast-feeding of about 14 per cent. occurred in the Borough of Ilford between 1920 and 1938. The decline seems to have taken place after 1930.

(b) The infant mortality rate during this period has fallen from 54 to 36·7.

(c) The place of breast feeding has been taken by dried milk.

(d) The proportion fed on liquid milk has changed little.

(e) The use of condensed milk has declined.

(f) Complementary and supplementary feeding has increased.

(g) The duration of breast feeding in months has been very considerably curtailed.

(h) The distribution of dried milk at the infant welfare centres has, per child, diminished during this period, although the percentage of breast feeders is less at the clinic than in the surrounding district.

2. The mother in the poorer districts tends to give up breast-feeding at an earlier date than the better-off parent.

3. Air-raids and evacuation appear to have had little effect on the type of feeding.

Thanks are due to Dr. A. H. G. Burton, the Medical Officer of Health, for allowing access to the necessary records and for permission to publish this paper, and also to Mr. L. Chandler and the Health Visitors of Ilford for their co-operation.

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CASE REPORTS

OLIGODENDROGLIOMA IN AN INFANT OF EIGHT MONTHS

BY

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The relative rarity of intracranial tumours in infants, the site of the tumour and the histological findings render the following case worthy of comment.

Case report

History. Thomas M., aged eight months (date of birth, February 18, 1941), was admitted to hospital on October 4, 1941, with a history of having developed a 'squint' of the left eye two weeks previously and for two days before admission having appeared listless and disinclined to take his feeds. There had been no vomiting and the stools were normal. No previous illnesses were reported.

FAMILY HISTORY. Father was said to suffer from 'chest trouble,' but mother and seven other children are alive and well. Father and two of the children have 'squints' and mother had one miscarriage six years ago.

Examination and progress. On admission the infant was found to be well nourished, weighing 17 lb. 6 oz., with no evidence of dehydration. He was thought to have ptosis of the left eye with strabismus, a rather tense fontanelle, and some slight neck rigidity. Kernig's sign was absent and there was no paralysis. Other examination was negative. Lumbar puncture was performed and a clear colourless fluid not under pressure was obtained. The following is the report on this specimen of cerebrospinal fluid: 'A clear, colourless fluid; total protein 0·04 per cent.; globulin negative; chlorides 0·70 per cent.; sugar normal; cells no increase; cultures remain sterile.' X-ray examination of the chest showed no evidence of disease. His condition remained as described for the next two days. Lumbar puncture was repeated on October 8, with the following result: 'A clear, colourless fluid; total protein 0·06 per cent.; globulin negative; chlorides 0·73 per cent.; sugar normal; cells 10 per c.mm. mainly lymphocytes; no organisms on direct examination; tubercle bacilli were not found; Wassermann reaction negative.' On October 10, the infant became semi-conscious and was found to have a right facial paralysis and right hemiplegia. The fundi were normal. There had been considerable loss of weight and the temperature rose to 101·8° F. Death occurred about 7 a.m. on October 11, the temperature having risen to 104° F. Mantoux reaction 1/1,000, blood Wassermann Reaction, and x-ray examination of the skull were negative.

Post-mortem examination revealed the presence of a small tumour, about the size of a large almond, situated in the mid-brain immediately above the pons varolii. The situation of the tumour can be seen in fig. 1. The upper part of the tumour was cystic and the roof of this cystic part is supported by a small bristle. Apart from the tumour no other abnormalities were found except a patent foramen ovale.

Professor T. B. Davie, Professor of Pathology in the University of Liverpool, has kindly allowed us to quote his report, which is as follows: ' The brain had been split sagittally and the right-hand half was received. This showed a tumour in the upper and posterior part of the crus, the centre of the tumour being level with the upper surface of the cerebellum. The tumour had replaced the posterior part of the crus, the aqueduct of Sylvius, the corpora quadrigemina and the pineal body. The cut surface of the tumour was roughly rounded and approximately 17 mm. in diameter. Its edges were sharply defined and its cut surface was very finely granular and pink in colour, contrasting sharply

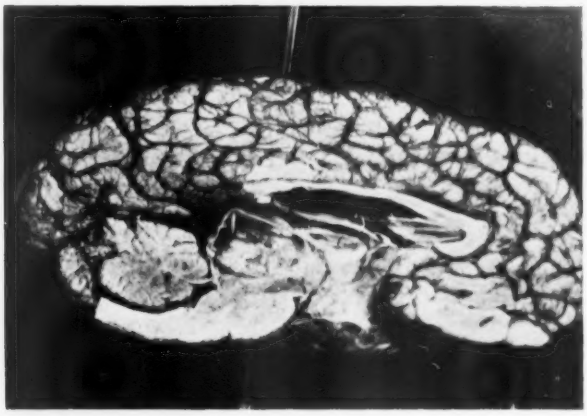

FIG. 1.

with the adjacent smooth, white brain tissue. The occlusion of the aqueduct had caused internal hydrocephalus with herniation of the third ventricle in the region of the pituitary stalk.

HISTOLOGICALLY the tumour was highly vascular with numerous wide capillaries. All but the periphery consisted of masses of rounded cells relatively loosely packed with no recognizable arrangement. The cells were relatively uniform in size, about 15 to 20 microns in diameter, with rounded nuclei and pink-staining cytoplasm in haematoxylin and eosin preparations. There were also a certain number of small giant cells about two to three times the size of the rest and containing often one, but sometimes two or three nuclei. No ' boxed cells ' were observed. With phosphotungstic acid-haematoxylin there were a very few fine fibrils between the tumour cells but no real matrix. There was no calcification. This part of the tumour appeared to be an oligodendroglioma. At the periphery where the tumour abutted on normal brain the structure differed. The cells were ovoid and closely packed and the histology resembled in every way that of a medulloblastoma.'

The microphotograph (fig. 2) shows the general histological arrangement. On the right-hand side can be seen normal brain tissue and next to this is a band of closely packed medulloblastomatous cells. On the left of the photograph is an area composed of loosely packed oligodendrogliomatous cells. Fig. 3 shows the closely packed medulloblastomatous cells and fig. 4 the loosely packed oligodendrogliomatous cells.

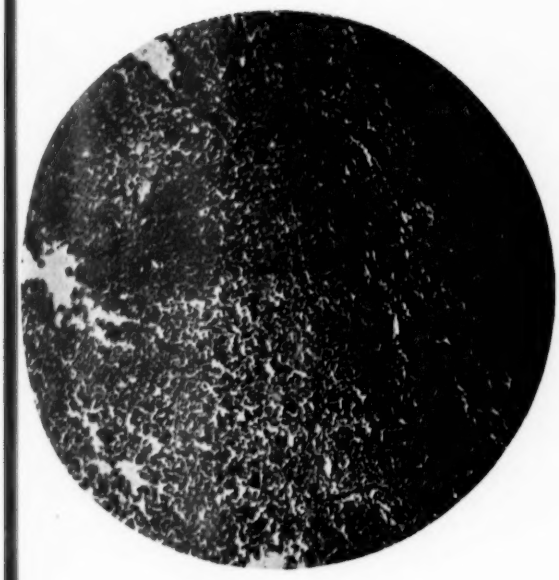

FIG. 2. ×60.

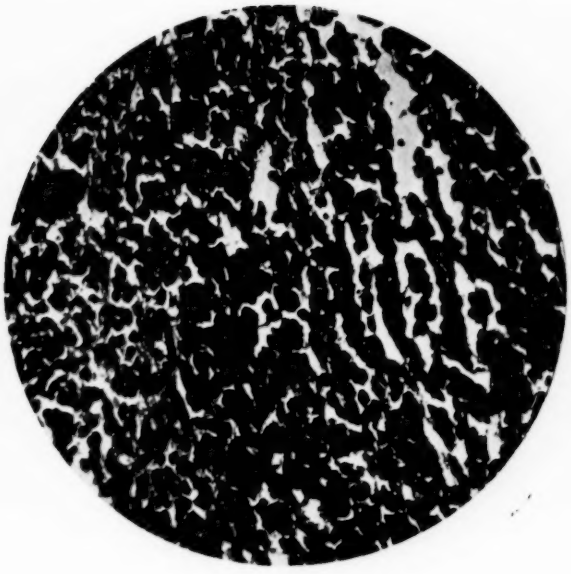

FIG. 3. ×350.

FIG. 4. ×350.

Discussion

The interesting features of this case may be discussed under three heads: (a) Age and incidence, (b) site, and (c) pathology.

Age and incidence. The tumour described occurred in an infant of eight months. In Critchley's (1925) series of 125 cases up to the age of sixteen years only one occurred in the age group 0–1 years, whereas in Bailey and Cushing's (1926) series of classified gliomas, numbering 254, there were twenty-nine medulloblastomas and nine oligodendrogliomas. In this series the average age of twenty-five cerebellar cases was ten years, the youngest being two, the oldest thirty-eight and sixteen occurring in the first decade of life. Among the oligodendrogliomas the youngest case was five years, but the authors make the interesting observation that very possibly all these tumours start in early life. Although ages are not given in detail, the youngest appears to have been a child of two years in the medulloblastoma group and a child of twenty-three months in the group of protoplasmic astrocytomas. In 1927 Bailey described additional cases added to the original series which brought the total to 378 cases, with a total of only twelve oligodendrogliomas. Dickson (1926) described a case of an oligodendroglioma of the fourth ventricle, occurring in a child of six years, in whom the symptoms had lasted for five months, but the child had been diagnosed as suffering from primary optic atrophy at the age of five months. In Cushing's series of 154 children, twenty-four fell in the age group one to five years, but no oligodendrogliomas are mentioned. In 1929 Bailey and Bucy described thirteen cases of oligodendroglioma, one of which was aged five years, and stated that ' these tumours are predominantly situated in the cerebral hemispheres of adults.' In Greenfield and Robertson's (1933) series the incidence of oligodendrogliomas is similar to that found by Cushing, namely nine oligodendrogliomas in 230 cerebral gliomas. In this series there were no infants, the youngest being two children aged sixteen years, one of whom had suffered from hydrocephalus for many years (possibly from infancy) when the tumour may have begun to manifest itself. Martin (1931) described a case in a girl of sixteen who had always had a large head but her symptoms had only been present for ten to twelve months. In Stern's (1937) series of 102 cases, six were in the 0–1 year period, of whom two were tuberculomas. No oligodendrogliomas are mentioned. She suggests that the low incidence of cerebral tumours in infants may be, in part, explained by the fact that most of the published cases come from neurological centres which infants rarely reach.

On the other hand, in this hospital which used to admit an average of 1000 infants per annum, intracranial tumours are excessively rare. From this brief summary it can be seen that an oligodendrogliomatous tumour in an infant is rare, although the history in certain older children suggests that their tumours may have been present from an early age, a theory which finds support in the present case.

Site. In the present case the tumour was situated in the upper and posterior part of the crus (fig. 1), i.e. supratentorial. In Critchley's series almost half were situated in the pons or cerebellum. The nine oligodendrogliomas in Bailey and Cushing's (1926) series were all found in the cerebrum and originated as subcortical lesions, the most common situation being the frontal lobes. On the other hand, medulloblastomas occurred most commonly in the cerebellum of children. In Dickson's case the tumour occurred in the floor of the fourth ventricle in the interpeduncular space and caused hydrocephalus of the third

and lateral ventricles. In Cushing's series of 154 children under fifteen years, eighty-five were cerebellar or subtentorial. As has been mentioned Bailey and Bucy (1929) stated that oligodendrogliomas are essentially tumours of the cerebral hemispheres. Martin (1931), who described two cases of oligodendroglioma and reviewed other cases mentioned in the literature, divided such cases into two groups, those occupying the cerebral hemispheres away from the mid-line and those lying across the mid-line and interfering with the circulation of the cerebrospinal fluid. Cases in the former group tend to be relatively 'silent,' irritative symptoms rather than paralytic symptoms being prominent. In the latter group, symptoms tend to appear much earlier with an unfavourable operative outlook. He found the site of election to be the frontal and parietal lobes where calcification, common in such tumours, has time to occur, but rarely occurs in the mid-line cases owing to earlier operation or death. Greenfield and Robertson's (1933) series consisted of five tumours, three of which were cystic tumours of the hemispheres and two were mid-line ventricular tumours and they came to the conclusion that a small medially placed tumour may cause as severe symptoms as a large laterally placed tumour. Of the sixty-two cases in Stern's (1937) series forty-one were subtentorial and nineteen were supratentorial, while two were cases of multiple tuberculomata. In the supratentorial group the majority were laterally situated, whilst in the subtentorial group the cerebellum was the commonest situation. She came to the conclusion that cerebral tumours 'kill by their site of election rather than by their nature or size.' In his opening paragraph Armour (1932) stated that 70 per cent. of all tumours are subtentorial, cerebellar tumours being about twice as common as those in the cerebrum in childhood.

In the present case the tumour, an oligodendroglioma, conforms to the usual supratentorial situation of these tumours, but its supratentorial position renders it somewhat uncommon in a child. The early onset of symptoms in a medially situated tumour is in keeping with the general experience.

Pathology. Bailey and Cushing's (1926) original description of the histological appearance of an oligodendroglioma is as follows : 'The neoplastic cells have spherical nuclei with a heavy chromatin network and are surrounded by a ring of cytoplasm which stains very feebly with ordinary stains. Between the cells is an indefinite material which stains neither for neurofibrillae, neuroglia nor for connective tissue. This material may give the growth somewhat the appearance of a cross-section of a plant. No mitotic figures can be seen. These tumours are prone to become calcified.' In a later paper (1927) Bailey suggested that oligodendrogliomas may be related to medulloblastomas. In one case, which had had repeated operations, the tumour was found to grow with the typical structure of a medulloblastoma. He stated that 'it is not surprising that these tumours should be related to the medulloblastomas for the oligodendroglia along the fibre tracts of the brain develops from medulloblasts which wander into this region and there differentiate into either oligodendroglia or neuroglia.' Reference has already been made to calcification. In the present case x-ray examination of the skull showed no evidence of calcification which may be explained by Martin's theory that a mid-line tumour, causing early death by its situation, may not have time to develop calcification. Greenfield and Robertson found the occurrence of cystic change common in their cases where rapid onset of symptoms in their laterally placed tumours was due to the expansion of cysts associated with slowly growing tumours. The upper part of the tumour in the present case was cystic, which may have had some bearing on the extremely rapid onset of symptoms at so early an age.

The interesting feature of the present case is the combination of an oligodendroglioma with a medulloblastomatous histology at its periphery which tends to confirm the view that an oligodendrocyte is developed from a medulloblast type of cell. It is also a rare example of a supratentorial medulloblastoma.

Summary

A case of a mid-line, supratentorial tumour with an oligodendrogliomatous centre and a medulloblastomatous periphery occurring in an infant of eight months is described, a rare combination of clinical and pathological findings.

Thanks are due to Dr. W. E. Crosbie, Medical Superintendent, Alder Hey Children's Hospital, for permission to publish this case, to Professor T. B. Davie, for permission to use his pathological report, and to Dr. Margaret Strange for her help with the investigations.

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TWO CASES ILLUSTRATING THE TREATMENT OF NEONATAL PNEUMONIA

BY

R. A. RATCLIFF, M.D.

A review of the pathological features of pneumonia in the new-born infant was recently published, and in that review Macgregor (1940) proposed a classification which would be equally useful clinically. The cases quoted below serve to illustrate the treatment of Macgregor's first type, namely that associated with aspiration of contents of the amniotic sac.

Case reports

Case 1. Baby K., a male infant, weighing 6 lb. 2 oz., was delivered after a long labour by an easy low forceps operation in the occipito-anterior position. The mother was a healthy primigravida and no abnormality occurred during pregnancy. At birth the infant was in a state of blue asphyxia, and an unusually large quantity of liquor amnii was drained from the mouth. Respiration became established without difficulty, but the lungs remained water-logged and air entry was restricted to the central and anterior parts of the lungs. Three hours after birth the infant breathed comfortably and there was no cyanosis, but respiration was noisy and there were râles to be heard over the anterior and upper parts of the lungs. At the bases and over the back there was little air entry and a few consonating râles.

For the first thirty-six hours of life the condition of the infant gave no cause for alarm. The colour was usually good, though there were attacks of cyanosis soon checked by administration of oxygen. No apparatus of the nature of an oxygen tent was available. During this time the infant was nursed on his right side to allow the left lung to become as free from fluid as possible, and the foot of the cot was raised. After the first eighteen to twenty-four hours no further liquor could be wiped from the mouth, and after twenty-four hours the motions passed contained a large proportion of vernix caseosa.

At the age of forty hours dyspnoea and cyanosis were much increased; oxygen was thereafter administered continuously through a nasal catheter. The moist sounds in the lungs were uniformly increased and the area of lung into which the air entered was much reduced. Alarming dyspnoea persisted for the next twelve hours and the distress then slowly diminished.

At the age of four days the left lung (lying uppermost) had appreciably greater air entry than before, though it was still very moist. The infant took small feeds of breast milk every two hours on this day, whereas only water had been taken until this time. No alteration of the baby's position was allowed.

At five days the infant breathed without effort and the moist sounds in the lungs were further reduced. Air entry into the right lung (lying downwards) became perceptible. On this day it appeared that the baby would probably recover if no infection developed in the still water-logged lungs. For this

reason I prepared some serum from his father's blood and on the following day I gave 20 c.c. of this serum intramuscularly into the thigh.

Rapid improvement occurred during the next twelve hours, and at seven days old the baby was taking two-hourly feeds well and the oxygen was no longer required. The lungs had become very much drier since the injection and were expanded all over.

At eight days old no abnormality could be found, three-hourly breast feeds were instituted and no further precautions were taken.

The baby was discharged home on his eighteenth day weighing 6 lb. 10½ oz.

Case 2. Baby S., a male infant, weighing 7 lb. 14 oz., was born to a healthy multigravida after a short labour, delivery occurring immediately after rupture of the membranes without any delay at the vulva. A considerable quantity of liquor had been inhaled by the infant who was in a state of blue asphyxia. Mucus and liquor were drained from the mouth and, the baby being vigorous, respiration was satisfactorily established though the respiratory passages still contained fluid.

For the first fifteen hours the infant breathed well, and though there was a slight degree of cyanosis no attack of respiratory failure occurred. After this time air entry heard over the posterior surface of the chest was poor, and at the bases quite absent, both behind and in front ; air entry in the front and upper parts of both lungs was good, and neither general nor local conditions gave any cause for concern, because the lungs as a whole were well expanded even in the airless portions, and respiratory movements were powerful. The prognosis was then regarded as good. The foot of the cot was raised; oxygen was administered for ten minutes every hour and two-hourly feeds of breast milk were given by bottle.

No great change was seen until the infant was sixty hours old; there was no attack of cyanosis, the infant fed well and his motions were normal.

At sixty hours old the baby became peevish, dyspnoea and cyanosis increased, appetite failed and his motions contained insufficiently digested breast-milk-curds and mucus. There was only a slight increase of moist sounds in the chest, but it was clear that a super-imposed catarrhal infection had complicated the disorder, making the prognosis much worse. The infant was given 10 c.c. whole maternal blood (not citrated) into the thigh. Oxygen was directed to be continuously administered, feeds to be maintained as regularly as possible and the baby was to be nursed only on his right side. For the next twenty-four hours there was a slight improvement, but there was more mucus in the motions.

When the infant was ninety-six hours old alarming respiratory failure occurred; 1 c.c. coramine was given, and he slowly revived. An hour later there was an even more alarming collapse; breathing stopped, the heart-beats fell to sixty per minute, and blood-stained mucus poured from the mouth while oxygen was given by nasal catheter. No further injection of stimulant was made, but breathing was established once more and the infant received an injection of 12 c.c. of his father's blood into the thigh. The father was bled further for the purpose of preparing serum for future use.

The baby's general condition did not improve during the next twelve hours though only one attack of cyanosis occurred, less alarming than the former.

At four-and-a-half days old the left (upper) lung had a moderately good air entry, but breath sounds were accompanied by many râles, and blood-stained mucus was still coughed from the bronchi. The bowels were more relaxed. An intra-peritoneal injection of 30 c.c. of father's serum was given on this day.

At five days, after a further twelve hours, the infant was more comfortable, dyspnoea was much less and the baby was able to take an ounce of breast milk from a bottle every two hours with some enthusiasm and without increasing

his dyspnoea. At this time air entry into both lungs was fair, râles were very much reduced, and oxygen was discontinued as there was no cyanosis and the nasal tube prevented sleep. The infant was still nursed on his right side.

At five-and-a-half days old 18 c.c. of father's serum was injected into the thigh.

At six days old there was good air entry into both lungs save for a small zone of airless lung at each base, more extensive on the right. Râles were still to be heard all over both lungs but were of a non-consonating character. Respiration was rather noisy, but there was neither dyspnoea nor cyanosis and the baby fed well. As the right lung was now almost equal to the left the infant could be nursed on either side with the cot flat, but was still fed without taking him up.

At seven days old no abnormality was to be found in his lungs and, in particular, there was no collapse even at the extreme bases. He fed from the breast well and the motions were fewer and contained little mucus.

At eight days old the chest was still normal. The motions were normal and the baby weighed only 7 oz. less than his birth weight. No further treatment was necessary and he was discharged home on his sixteenth day weighing 7 lb. 10 oz.

Comment

Diagnosis. As these infants both recovered there is no certainty that they were cases of pneumonia, and in infants recovering so quickly no more than very small areas of pneumonia can have existed. The clinical diagnosis rests upon the sudden deterioration in their condition and the coincident increase in physical signs throughout the lungs, though some of this increase should be attributed to the oedema shown by Henderson (1931), and later investigators, to be a necessary consequence of asphyxia. However, if neonatal pneumonia is to be treated with reasonable prospect of success this must be done at an early stage, which is well represented by the two cases described.

Treatment. The general treatment is not debateable, and the only comment to be made is that oxygen would have been more efficiently given with some form of oxygen tent, had it been available. The nasal catheter in a newborn infant is a source of troublesome increase of mucus secreted from the pharynx, and I therefore prefer that it should be inserted at intervals only, if the baby's condition permits.

The position of the infant employed to promote postural drainage is described, but this can only be expected to drain the trachea and bronchi. Surface tension alone is sufficient to prevent fluid draining from the bronchioles and alveoli without assuming that the smallest subdivisions of the lung are consolidated by inflammatory exudate. In each case no appreciable quantity of the inhaled liquor drained out after eighteen to twenty-four hours, though its presence was demonstrated by the absence of resonance and the character of the râles in a fully expanded area of lung.

Both these infants had reasonably well-expanded lungs, and this fact serves to confirm the statement made by Blaikley and Gibberd (1935) that intratracheal insufflation is of no use in treatment of neonatal asphyxia due to aspiration of large volumes of liquor amnii. If there had been any degree of atelectasis it would have been wise to attempt to promote expansion of the lungs very soon after birth to relieve embarrassment of the heart.

The rapid improvement of each baby after injection of human serum was interesting. In each case the reason for this treatment was infection, threatened in the first and established in the second, but there is no evidence to show what was, in fact, the mode of action of this serum. The improvement took place so soon after the injection of a large dose that some immediate reaction in the infant's lung was probably responsible.

Macgregor (1940) in her account of the pathology of neonatal pneumonia refers to the oedema associated with the condition, and this oedema is much greater than in any comparable inflammatory process in the adult lung ; the difference must surely be due to greater capillary permeability in the newborn infant. It follows that the simplest explanation of any such rapid improvement as that observed in these babies is the absorption of oedema fluid, without supposing that any true pneumonic process is suddenly reversed. I therefore believe that the injection of a large dose of serum diminished the capillary permeability and so reduced the pulmonary oedema resulting from asphyxia, whereas the later effect of increasing resistance to infection produced a less striking change.

There is no direct evidence which supports this view and I can only quote, in analogy, the rapid disappearance of some types of oedema neonatorum after injection of adequate doses of serum. If some experimental or other evidence should be obtained in support of this hypothesis, the conclusion would be that every newborn baby with any degree of dyspnoea associated with increasing moist sounds in the lungs should be treated by the injection of human serum in fairly large doses.

Summary

Two cases of neonatal pneumonia, associated with aspiration of contents of the amniotic sac, and ending in recovery, are described. The treatment is discussed with particular reference to the rapid improvement which followed injection of human serum.

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A CASE OF EXFOLIATIVE DERMATITIS OF THE NEWBORN (RITTER'S DISEASE)

RECOVERY FOLLOWING TREATMENT WITH SULPHAPYRIDINE

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Acute exfoliative dermatitis of the newborn is a clinical rarity. In the paediatric and dermatological literature individual cases are reported, and from time to time small groups of three or four unconnected cases are collected.

Leiner (1930), over a period of twenty years, was able to observe only twenty cases of which eighteen were fatal. Yet, when Ritter von Rittershain (1878) first described the disease he based his observations on no fewer than 279 cases. These facts introduce a doubt as to whether or not Ritter's original series was a true clinical entity ; that there was some contemporary confusion on this point is emphasized by the controversy as to the nature of this condition which arose between Behrend (1879) and Ritter. Ritter, writing in 1880, was at pains to emphasize his original description of the condition and protested with acerbity against Behrend's confusion of the true acute exfoliative dermatitis of the new-born with pemphigus neonatorum.

And, indeed, Ritter's original description of the condition, the widespread loosening of the epidermis from the corium, without the preliminary formation of definite blebs or bullae, the rapid extension of the process of epidermolysis in the course of a few hours, and the exposed areas of dry, red corium, free from exudate, but surrounded by shreds of loosened epidermis—leaves a very definite picture which cannot be mistaken on the rare occasions when it is now seen. Yet, from a study of the literature of this subject it appears that there is still among modern writers some confusion of Ritter's disease with pemphigus and similar lesions of the newborn, though this confusion has largely been confined to discussions of the possible common etiology and pathogenesis of these clinically different conditions.

Case report

On November 6, 1941, a nineteen days old male infant was brought to hospital on account of a skin infection of the face. On November 1 he had been discharged with his mother from a maternity hospital, where the progress

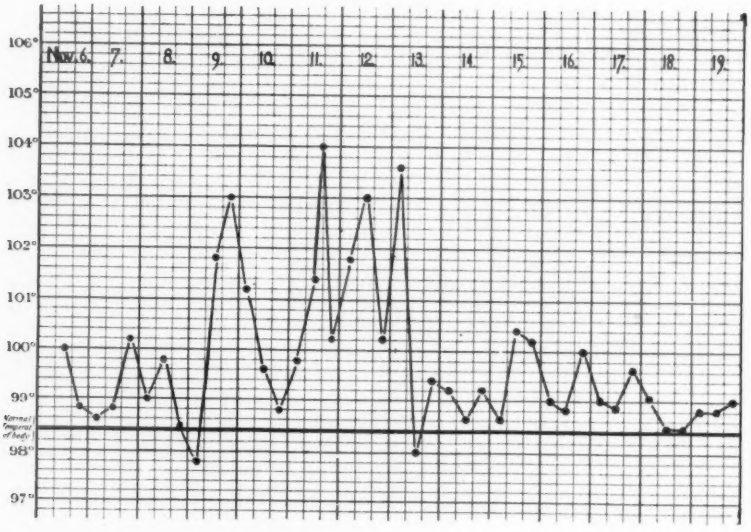
following a normal delivery had been uneventful except for a slight puffiness of his eyes on the last two days. On November 3 the eyes had become more swollen. There was a slight mucopurulent discharge, and the skin of the face was dry and scaling. On the day before admission, according to the mother's account, a moist patch spread over the face and, on the day of admission, the face, parts of the chest, the buttocks and groins were involved. On undressing the baby in front of the mother, a raw patch about two inches across was revealed on the abdomen, and the mother uttered an involuntary exclamation of surprise, as this lesion had been much smaller when she had dressed the baby an hour or two earlier.

On admission to the ward the condition was as follows : temperature 100° F., pulse 120, respiration rate 40. There were moist, raw patches over the scalp and cheeks and round the eyes, the lids of which were puffy, and from which a serous discharge was exuding. There were raw red areas, bordered by shreds of peeled epidermis on the neck, the front of the chest and abdomen, the groins, buttocks and parts of the back. According to the mother, this condition had developed in the past six hours. There were no other abnormal physical signs.

Treatment. The baby was placed in a cot naked under an electric cradle, lying on cotton wool, with its legs and arms ' spread-eagled ' to prevent rubbing of the lesions. 2 per cent. aqueous solution of gentian violet was painted over the whole body once daily. M and B 693, 0·25 gm., was given four-hourly, the first dose intramuscularly and subsequent doses by mouth up to a total of 3·5 gm.

Twenty-four hours after the initiation of treatment the areas of desquamation had spread slightly over the chest, back, buttocks and in the groins, but after forty-eight hours all spread had ceased. Repeated swabs taken from areas of exposed corium after the application of gentian violet gave a pure culture of staphylococci which haemolysed human red cells.

On the third day the temperature had fallen to normal (see chart) and M and B 693 was discontinued; but during the next two days the temperature swung up to 102° and 103°, and in view of the bacteriological findings M and B 760, 0·125 gm., four-hourly, was given for seventy-two hours. The temperature, however, continued to swing to 103° and 104° F. and a considerable degree of hyperpnoea developed. There were no signs of chest complications and no evidence of



Temperature chart. For description see text.

spread of the skin infection. It was concluded, therefore, that the pyrexia and the hyperpnoea were due to heat-stroke, owing to the application of gentian violet interfering with the normal heat-loss through the skin. The M and B 760 was therefore discontinued and a larger, more airy electric cradle was used in which lower air-temperatures could be maintained. The child's temperature then fell and, apart from a rise to 100° F. forty-eight hours later, remained between 98° and 99° F. for the rest of the baby's stay in hospital. The gentian violet coagulum was allowed to peel off little by little during the next ten days, revealing as it did so perfectly healthy skin. The skin of the neck was the last to heal entirely as it was impossible to prevent its being chafed by the movements of the baby's head.

Fortunately the feeding gave rise to no anxiety as the baby had a good appetite throughout and did not vomit. Expressed breast-milk was obtained from the mother, even when for a few days in the second week she had a superficial breast abscess. It is to be regretted that no culture was made of the pus from the abscess. The feeds were gradually increased from 3 oz. every three hours to 4½ oz. every four hours on discharge.

The weight of the baby at birth was 7 lb. 1 oz. and on admission 7 lb. 4 oz.; it then fell 12 oz. in the first nine days of the illness, but after that rose steadily, being 7 lb. 12½ oz. on discharge after one month in hospital.

Comment

The diagnosis of this case rests on the striking similarity of its appearance with those cases originally described by Ritter and with the few cases recorded subsequently. It is to be noted that there were no vesicles or bullae at the onset of the disease. The patches of desquamation on the face were moist, but this may have been due either to the moisture from the mouth or a secondary infection. The rapidity of spread of the lesion was perhaps its most outstanding feature. One of us (D.B.) has seen previously two examples of this disease, and on both occasions the spread of the desquamative process was so rapid as to flay large areas of the infant's body in the course of a few hours. In one of these cases the mother, on undressing the child, was as surprised and alarmed as was the mother in this case. These previous cases, seen before sulphonamide drugs were available, were fatal.

The course of treatment was based on the assumption that the infection was coccal. In the past only local treatment to the skin has been available, and such antiseptics as silver nitrate and potassium permanganate have been used, but with discouraging results. In this case the question naturally arose as to whether sulphapyridine should be applied to the skin, but in view of the almost complete absence of exudate from the exposed corium and the difficulty of applying sulphapyridine paste satisfactorily to a skin so liable to further exfoliation, it was decided that some penetrating antiseptic, namely gentian violet, should be applied over the child's whole body. With the further rise in temperature on the fourth and fifth day of the disease and in view of the repeated pure cultures of staphylococcus it was thought, mistakenly, that sulphathiazole might be a more efficient bactericidal agent; but it soon became obvious that the infant was in fact suffering from a mild degree of heat-stroke due to the thoroughness with which the local treatment had been carried out,

and this view of the situation was confirmed by the rapid improvement in the child's condition when the painting of the skin was discontinued and a cooler cradle provided.

The repeated pure cultures of staphylococcus obtained from areas of corium which had recently been painted with gentian violet strongly suggest that such local treatment played little or no part in the recovery of this case. The failure of this application to destroy the staphylococcus in this case seems to contrast strikingly with general dermatological experience of the usefulness of this dye in cases of pemphigus neonatorum or bullous impetigo.

A search of the literature discloses only one case of this disease successfully treated with one of the sulphonamide group of drugs.

De Sanctis and De Lorenzo in 1941 reported the case of a sixteen days old infant who, shortly after the operation of circumcision on the seventh day of life, developed purulent vesicles and bullae about the mouth and upper extremities. This was followed by extensive exfoliation without further bullae formation, and cultures of the skin grew staphylococci and streptococci. The infant was treated with sulphathiazole and recovered.

Ryan and Goldman in 1940 reported four cases treated with sulphapyridine. They gave 0·39 gm. as an initial dose, followed by 0·13 gm. four hourly, for the first three days and 0·06 gm., six-hourly, subsequently. These doses are certainly small, and this may account for the hundred per cent. mortality which they record. All these infants had blood transfusions.

Scott (1941) described a fatal case of Ritter's disease in a negro infant in which the skin lesions were treated with a 1 per cent. aqueous solution of gentian violet, but he specifically mentions that the case came under his care before sulphapyridine and sulphathiazole were released for general clinical use, and the child did not recover.

There are a number of other cases of exfoliative dermatitis of the newborn recorded in the literature in which the skin lesion appears to be part of a more general infection.

Thus, Guy and Cohen (1929) described a fatal case in which bacillus pyocyaneus was isolated in pure culture from the heart blood at autopsy, and in this case there was a haemorrhagic cyst of the suprarenal and ulceration of the intestine. The condition appears to have been a septicaemia of the newborn with associated skin lesions.

Cairns (1923) described under the heading ' A Case of Ritter's Disease ' the spread of a bullous lesion resembling pemphigus foliaceus starting on the seventh day of the infant's life and terminating fatally after eleven days. Even as late as the tenth day of the disease fresh bullae formed and, if it is correct to regard Ritter's disease as a clinical entity consisting entirely of rapid exfoliation of the epidermis without the formation of bullae, then, this case could more properly be classed as one of severe pemphigus.

It is, of course, impossible to conclude from this solitary case that sulphapyridine was the curative agent, but the entirely satisfactory outcome encourages the use of the drug when this rare condition is encountered. As has been indicated above it may well be that the widespread application of gentian violet is not only unnecessary but useless, and the danger of interfering with heat-loss by the adoption of such a technique must be borne in mind.

No comment can be usefully made on the possible connexion between the mother's breast-infection and the infant's skin condition as no bacteriological record in the mother's case is available.

A tribute must be paid to the unremitting skill and care of the sister and nursing staff of the children's department of Queen Mary's Hospital for the East End.

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POST-VACCINIAL ENCEPHALITIS:

RECOVERY FOLLOWING TREATMENT WITH INTRAVENOUS PENTOTHAL SODIUM AND CONVALESCENT SERUM

BY

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Encephalitis has now been recognized for many years as a rare but serious complication of vaccination and some hundreds of cases have been reported. Its incidence is mainly in older children and young adults undergoing primary vaccination and it is extremely rare in the first year of life. Thus, in a serious outbreak in Holland in 1929 there were eighty-three cases resulting from about one and a quarter million vaccinations, none of which affected infants under the age of twelve months (Brain, 1940). In this country only eight cases in infants were reported to the Ministry of Health in the eight years from 1932 to 1939, and of these five were fatal. The rarity and seriousness of the condition are thus evident.

The following case, in which recovery occurred in an infant aged four months, is recorded for two reasons—firstly because of its rarity, and secondly to draw attention to the efficacy of pentothal sodium and convalescent serum in treatment. Pentothal sodium is a valuable addition to the armamentarium of the paediatrician in the control of convulsions in infants and small children and has, in our experience, brought an end to intractable convulsions in three infants in whom all other measures had proved ineffective.

Case report

A first-born male infant of four months was admitted to the Leeds General Infirmary under the care of Prof. C. W. Vining on May 30, 1941. Its previous health and development had been satisfactory. On May 16 vaccination had been performed by a single scratch of a quarter of an inch on the left upper arm without any unusual local inflammatory reaction occurring. The infant's general condition had also remained satisfactory until May 27, when it became restless and was noticed to be making spasmodic movements of the head and eyes to the left. During the next two days its general attitude became one of gradually increasing muscular rigidity, and, though drowsy, it seemed to recognize its parents and would follow them with its eyes. Feeds had been taken fairly well, with vomiting on one occasion only, up to the time of admission on May 30. There had been some recent loss of weight.

On admission the infant appeared ill. Its eyes were widely staring, and, although restless, it was clearly out of touch with its surroundings, and did not recognize anyone or respond to visual stimuli. Muscular tone was generally increased, and there were, in addition, repeated jerking movements of the head and eyes to the left, and occasional flexor spasms of the thighs on the abdomen. Perhaps the most striking feature was a rapid respiratory rhythm varying between fifty and sixty movements per minute and associated with inspiratory stridor. There were no signs to suggest meningitis, the fontanelle was not bulging, and examination of the discs and fundi showed nothing abnormal. The temperature and pulse rate on admission were 98·4° F. and 132 per minute respectively. In spite of its condition the infant was able to swallow and, in addition to feeds of a dried milk mixture, was given one grain of chloral every four hours.

On the following morning the child's condition had deteriorated considerably. Restlessness was more severe and associated with short attacks of generalized convulsions in spite of increasing doses of bromide and chloral; rigidity of the limbs remained. The increase in respiratory rate had become more marked and of unusual character in that no pause followed either inspiration or expiration, the appearances suggesting a central stimulation of the respiratory centre. Lumbar puncture was performed and clear fluid obtained under normal pressure ; cytological and chemical examination of the fluid showed no abnormalities.

During the day chloroform inhalations were repeatedly given in an attempt to control restlessness and convulsions, but with only slight general effect and with none upon the respiratory rhythm. At 5.0 p.m. morphine 1/48 grain was given, without response, and shortly afterwards there was regurgitation of altered blood from the stomach, which recurred at frequent intervals in the next three hours. At this stage the infant appeared moribund, sunken-eyed, pale and cyanosed, but still restless with a respiration rate of 90 to 100 per minute. The temperature was 103° F. and the pulse rate 180.

In the meantime 10 oz. of whole blood had been obtained from each of two probationer nurses who had been successfully vaccinated three to four weeks previously. The serum was obtained by centrifuge, and, in view of the seriousness of the condition, it was decided to administer it intravenously.

At 7.0 p.m. an intravenous infusion of glucose saline was begun, using a vein at the bend of the right elbow. General restlessness and tachypnoea were still very marked, and for this reason 0·025 gm. sodium pentothal was given with the first 2 to 3 oz. of fluid as it was feared that the continued muscular activity might, in itself, cause a fatal issue. The effect was immediate and dramatic. Within a minute or two general muscular relaxation occurred, and respiration, though still rapid, became quiet and peaceful; it was as though natural sleep had suddenly supervened on a severe delirium. During the next two hours 5 oz. of serum were given, followed by glucose saline to a total of 15 oz. Throughout the night the child remained peaceful, and its condition was greatly improved on the following day; it was able to take feeds by mouth though still stuporose. No further convulsions occurred, but the respiration rate remained high.

On June 2, the temperature fell to normal and the general improvement was maintained. No particular abnormalities were noted on examination though the child remained uninterested in its surroundings. It was discharged on June 4, six days after admission, apparently well.

The child was seen again on November 18, 1941, at the age of ten months. It then weighed 16½ lb. and was taking a mixed diet. The parents reported steady progress since discharge from hospital and they considered the mental

condition to be satisfactory. The child was not then able to sit up with certainty, but was attempting to find its feet and was generally very active.

Physical examination revealed no particular abnormalities. All the limbs were moved actively, the fontanelle was open but not bulging, and in general, apart from some slight reduction in general nutrition, the child appeared normal and showed no sequelae of its illness.

Comment

In the consideration of this case two matters seem to call for discussion; first, the accuracy of the diagnosis, and secondly, the treatment employed. The circumstances of the case were such that it is felt that the diagnosis of post-vaccinial encephalitis was fully justified. Recurrent convulsions, without apparent cause, even when repeated and sufficiently severe to cause death, are not rare in infancy, but in view of the gradual onset eleven days after vaccination and the prompt response to treatment, it seems reasonable to place the vaccination and the ' encephalitic state ' in direct relationship. The incubation period of this condition is stated to be between nine and nineteen days—usually between the tenth and twelfth days, as in this case.

The treatment of post-vaccinial encephalitis is a matter in which there seems to be no very clear medical opinion. Brain (1940) reports ' encouraging results ' by a number of authors following ' the injection of serum or citrated blood of a recently vaccinated person ' ; it is suggested that the serum may be given intrathecally, but that it may be equally effective intravenously in doses of 10 c.c. Recently, Burton and Weir (1941) successfully treated an infant of six months by giving 20 c.c. of paternal blood intramuscularly and later 20 c.c. of blood on four successive days from a nurse vaccinated two months previously: this treatment was supplemented by the administration of sulphapyridine parenterally and by mouth.

In the present case the most pressing indication for treatment was provided by the persistent restlessness, convulsions and respiratory distress which, in themselves, seemed to constitute a threat to life, and it is felt that the administration of pentothal sodium was the most valuable part of the treatment in that it provided rest where other measures had failed. Dehydration had also contributed to the moribund state and was relieved by intravenous fluid. It is difficult to assess the part played by the convalescent serum, which was given in much larger quantity than in previously reported cases, but it seems reasonable to suppose that it exerted a beneficial effect in the period following cessation of the convulsions. It is evident that large quantities of serum may be given without danger.

Summary

A case of post-vaccinial encephalitis in an infant of four months is reported. Recovery followed treatment with intravenous pentothal sodium and convalescent serum, and the value of the former in the treatment of infantile convulsions is emphasized.

Thanks are due to Prof. C. W. Vining for his encouragement and permission to publish this case report.

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BRITISH PAEDIATRIC ASSOCIATION

PROCEEDINGS OF THE FOURTEENTH ANNUAL GENERAL MEETING

The Fourteenth Annual General Meeting was held at the Old England Lake Hotel, Windermere, on Friday, May 29, 1942.

Business Proceedings: The President, Prof. L. G. Parsons (Birmingham), was in the Chair, and there were present 24 members and 6 guests.

The Minutes of the last Annual Meeting were read and confirmed.

It was reported that the officers and members nominated by the Executive Committee had been elected for 1942/3 by a postal ballot. These were as follows:—

President.—Prof. L. G. Parsons.

Treasurer.—Dr. Donald Paterson.

Secretary.—Dr. Arthur Maitland-Jones.

Honorary Members.—Dr. H. C. Cameron and Dr. D. Nabarro.

Executive Committee.—Dr. A. A. Moncrieff (in place of C. F. Harris); Dr. J. C. Spence (in place of C. W. Vining); Dr. A. G. Watkins (in place of J. M. Smellie), Dr. W. R. F. Collis, Dr. S. G. Graham, Dr. W. G. Wyllie.

The Treasurer's Report, showing a balance at the Bank of £191 19s. 5d. was received and approved.

It was agreed, on the recommendation of the Executive Committee:—

(1) That this year's donation to the Royal Medical Benevolent Fund be £10 10s. instead of £5 5s.

(2) That a further sum of £100 be invested in 3 per cent. Savings Bonds.

It was also agreed that the sum of £3 3s. be sent to the Royal Medical Benevolent Fund of Northern Ireland, and that a further sum of £10 10s. be sent for the aid of sick Russian children.

It was agreed that the choice of the place of next year's meeting be left in the hands of the Executive Committee.

The President submitted a letter from Dr. Boldero from the three Colleges, asking whether the Association would appoint a sub-Committee to answer questions and give evidence before the Colleges in connection with Paediatrics. It was agreed that the Executive Committee act as this sub-Committee on behalf of the Association.

The President brought to the notice of the Meeting that a movement afoot proposes the abolition of the Register of Sick Children's Nurses. It was agreed that a communication be sent to the General Nursing Council, and to the Nursing Division of the Ministry of Health, strongly urging the retention of the special register of Sick Children's Nurses.

Scientific Proceedings—Communications:

1. Dr. W. G. Wyllie (London): 'Oesophageal spasm and stenosis.' This communication, illustrated by lantern slides, dealt with ten cases of oesophageal obstruction seen in the last two years. Eight were of organic stenosis and two of cardiospasm. Features in agreement with other groups of similar cases were the ages of onset of vomiting in the two types, at birth or on weaning in the cases of stenosis, and any time in childhood, though commonly not until adult life in the cases of spasm. Of the organic cases the stricture was at the cardia in one and at a level opposite the fifth to the eighth dorsal vertebrae in seven. The mortality is high; three out of ten in the present series died.

Four points arising out of this group of cases were of special interest:

(1) In the cases of organic stricture the element of superadded spasm dominated the clinical picture and the x-ray appearances, producing states of almost normal swallowing, partial or complete obstruction.

(2) The condition known as short oesophagus with herniation through the diaphragmatic hiatus of the abdominal portion of the oesophagus as well as a portion of the stomach was discussed. True and false examples of this condition were shown.

(3) An unusual feature in a case of cardiospasm, namely, spasm intermittently of the lower three inches of the oesophagus.

(4) The limitations of active treatment. Bleeding from ulceration was an almost invariable consequence of endoscopy, and of treatment by bougies in the organic cases.

2. Dr. Donald Paterson (London): 'Case of cardiospasm' (with slides). A male infant was seen on the eighteenth day of life with a history of vomiting and failure to gain weight. He had vomited black material for the first three days after birth, and the motions were said to have been tarry in appearance. His weight had fallen from 6 lb. to $5\frac{1}{4}$ lb., and he was admitted to hospital. During the next three weeks the weight was stationary with slight vomiting. When six weeks old a barium swallow was given, which showed a dilated oesophagus, with much narrowing and apparent spasm at its lower end, in the region of the cardiac end of the stomach. A tube was passed, but it curled up in the dilated oesophagus; a stiffer mercury tube, however, passed through. This was passed twice daily, then once daily, and finally, this was stopped altogether. The infant gained 6 lb. in the next twelve weeks, and appeared perfectly normal.

3. Dr. Stanley Graham (Glasgow): 'Observations on the incidence of certain nutritional disorders in hospital children.' Three common nutritional defects, namely, wasting, iron-deficiency anaemia and rickets are still common in hospital children in Glasgow. In a series of 300 consecutive cases under eighteen months of age admitted over a period of twelve months, the incidence of these diseases was estimated. Certain very ill children were purposely omitted, and in others the blood examination was not done lest it prejudice the chances of recovery. Out of 295 cases, 197 were more than ten per cent. below the average weight for age and 62 were more than thirty per cent. below. In 245 cases in which the blood was examined, the haemoglobin level was more than ten per cent. below normal in 115 and of these 51 were more than twenty per cent. below. The incidence of rickets was more difficult to assess. Taking the lower limit of normal serum phosphorus as 3 mgm. per cent., 89 out of 203 cases showed a low serum phosphorus level. When examined clinically (cranio-tabes included) 76 out of 269 gave positive evidence of rickets, and radiologically 49 out of 208 examined showed positive signs. These nutritional defects are to a large extent preventable, and the physician in a children's hospital, working as he does outside the child welfare services, is not in a position to alter the present state of affairs. It is suggested that paediatricians on the teaching hospital staffs should take part in the work of the child welfare services.

4. Dr. A. V. Neale (Birmingham): 'Two unusual cases.' (a) Agenesis of one lung.—The patient was a child of four months who suffered from variable cyanosis and respiratory distress with an intermittent loud stridor. Examination of the chest showed a wide cardiac impulse, also seen to the right of the sternum. The breath sounds over the left lung were normal. The trachea was deviated to the right and the breath sounds were absent over the right lung. Sudden death occurred at four months of age. Post-mortem examination showed absence of the right lung except for short bronchial stumps and a few undeveloped air sacs. The heart was large and showed congenital atrial septal defect and a dilated pulmonary artery. (b) Congenital morbus cordis?—A child aged two years was admitted to hospital with dyspnoea and variable cardiac oedema. There was no history of any definite illness before admission. Physical examination of the heart showed moderate general enlargement. There were presystolic and systolic thrills and murmurs in the mitral area and an aortic systolic murmur. The pulmonary second sound was accentuated. A clinical diagnosis of mitral stenosis and regurgitation with aortic stenosis was made. The patient died of congestive heart failure. At post-mortem examination the heart showed a very narrow left auriculo-ventricular ostium, with a firm, hard and resistant mitral ring through which the little finger could not be passed. The mitral valve was transformed into a thick, hard plate, with both cusps fused. There were fibrous areas in the papillary muscles and beneath the endocardium of the intraventricular septum on the left side. The aortic valve cusps were thick, fibrosed, stiff and fused. The tricuspid and pulmonary valves were normal and the septa were normal. Histological examination of the heart showed no Aschoff nodules, but there were fibrotic changes in the papillary muscles. The case is presented as an example of mitral stenosis in a child of two years, but the etiology is obscure, possibly the result of endocarditis.

5. Dr. G. Bray (London): 'The allergic aspects of urticaria and angioneurotic oedema.' Urticaria and angioneurotic oedema are conditions in which whealing is the basic pathological condition; and although all wheals are not necessarily allergic, the allergic mechanism is the most common one capable of producing whealing. The allergen, reacting on sensitive tissues,

produces a diffusible histamine-like substance which causes local vascular and lymphatic changes. Though affecting most usually the skin and subcutaneous tissues, reactions may be noted in mucous membranes and in other organs. The etiology includes both allergic and non-allergic factors.

(a) Non-allergic, arising in normal individuals from the local production of a diffusible substance.
  (i) Drugs. Histamine, alkaloids.
  (ii) Poisons. Decomposed foods (ptomaines).
  (iii) Animal. Bites and stings.
  (iv) Vegetable. Nettles and hairy plants.

(b) Allergic, in hypersensitive individuals from the liberation of ' H-substance.'
  (i) Inhaled. Feathers; hairs, pollens, dusts.
  (ii) Ingested. Foods; drugs (aspirin, phenolphthalein).
  (iii) Injected. Overdose of allergen, serum reaction, blood transfusion; insect bites and stings.
  (iv) Infectants. Bacteria; intestinal parasites.
  (v) Contactants. Animal hairs (touching, licking, or in bedding); foods through external contact; dyes in clothing; adhesive plaster.
  (vi) Physical agents. Light, heat, cold, trauma.

In order to prevent recurrences, instead of ' starving, purging and calcifying ' the patient, first stop all previous medication; consider possible inhalant factors; avoid causative foods and correct the digestion, probably with acid tonics. In a few cases it may be necessary to avoid contactant irritants, remove septic foci and raise the basal metabolism.

6. Dr. A. White Franklin (London): ' Threadworm therapeutics.' He pointed out the inadequacy of current routine treatment and the impossibility either of diagnosing the true incidence of the infestation or of proving its cure without the use of a peri-anal cellophane swab. Miss Young of the Institute of Agricultural Parasitology found 42 per cent. of 119 cases positive at Cell Barnes Hospital after three swabs. A trial of four drugs was reported, the cases being diagnosed by swab examination and cure claimed if seven swabs were negative up to three weeks after the end of treatment. Phenothiazine cured 13 of 15 completed cases without complications, but as untoward results have been encountered by others, the drug should not be used. The tests showed that an orally taken drug alone could be effective. Sulphaguanidine was unsuccessful in 3 cases tested. Oxylan in doses up to four times manufacturer's was only successful in 1 of 8 cases. Gentian violet is now being tested with success. To decide which need treatment, if one-third of all children are infested, forty-five histories were analysed. Probably pruritus ani is the only symptom absolutely caused by threadworms, although any obscure case with abdominal symptoms and without other discoverable cause should be treated. At least one other case was found in every family where investigation was possible, in six families the mother being infested. If the worms recur and symptoms return the whole family should be dealt with. Re-infestation can occur from sucking infested fingers, so that nails should be kept short and hands scrubbed before meals. Since cure was possible by effective drugs by mouth alone, he asked paediatricians to set a good example by never again ordering series of washouts or enemas, at least for the younger children.

7. Dr. G. Daynes (introduced by Dr. Donald Paterson): ' An analysis of a thousand cases of congenital pyloric stenosis treated by surgery.' An analysis of a thousand cases of congenital pyloric stenosis treated by Rammstedt's operation at the Hospital for Sick Children, Great Ormond Street, was presented.

Attention was drawn to the following points:—

(1) The age on admission was about six weeks while the onset of symptoms usually occurred at three weeks, illustrating the delay before the diagnosis was made.
(2) There were six males affected to every female, but there was no significant difference between the male and female mortality.
(3) The effect of special nursing precautions was shown by a drop in the mortality, and a further decrease was obtained by nursing the babies in separate cubicles.
(4) The war brought about an increase in the mortality owing to the breakdown of the system of isolation, as the babies had to be nursed together in the corridors during air raids.
(5) The mortality of cases operated on after the eighth week was much higher than that of younger ones. In view of this, it was suggested that medical treatment should be tried in cases over the age of eight weeks.

8. Dr. A. G. Watkins (Cardiff): ' A portable oxygen tent for infants.' This consisted of non-inflammable x-ray films strengthened at their edges by a copper-wire frame and hinged together by strapping so that they formed a collapsible box. Tapes were let into the sides of each frame to be tied when the tent was erect to make it airtight. X-ray films size 17 in. by 14 in. were used for the roof, back and front, and size 15 in. by 12 in. for the two sides. The

front flap was shortened so that it could rest on the cot clothes when the tent was placed over the infant, and the oxygen was introduced by rubber tubing through a hole high up on the back frame. A flow of 3 litres oxygen per minute gave an oxygen concentration of 46 per cent. within the tent which gave an alveolar oxygen of 34·5 per cent. compared with 27 per cent. alveolar oxygen when given through a nasal catheter. The apparatus was light and could be readily folded into an x-ray film box and needed no special nursing skill for its use. Cooling was adequate and the infant readily attended to by lifting the front flap. Its main use was in domiciliary work to replace the unsatisfactory nasal catheter and the cumbersome and wasteful large oxygen tent.

9. Dr. R. Collis (Dublin): 'An epidemic of nephrosis occurring in the neonatal period.' He described nine cases, all premature babies with an average weight of $4\frac{1}{2}$ lb., four of whom died. The general course was as follows: After being normal for one week they began to lose weight; the motions became loose, mustard-coloured, and then diarrhoea set in which ceased before death. There was no vomiting and no rise in temperature. The urine contained much albumin and many granular casts but no organisms. There was no oedema. The feeding programme was normal. They all had milk boiled for three minutes in a special saucepan. Three babies who recovered stopped having their symptoms when the feeds were changed and prepared in an iron saucepan. Nothing further occurred for some months, and then a number of cases with more or less similar symptoms began to occur again. The most marked symptom was albuminuria and multiple casts in the urine. One case showed marked punctate basophilia. The second group of babies had the water for their dried milk boiled in a kettle made from the same alloy as was the saucepan used for the milk in the first group. Chemical investigation of the alloy used showed that it consisted of copper, aluminium hydroxide and aluminium silicate, and the amount of copper present was appreciably large. Post-mortem investigations of two fatal cases showed some cloudy swelling of the kidneys. The ash of the kidneys in one case contained 3·5 mgm. of copper and in the second case there was 1·6 mgm. of copper and a very faint trace of aluminium. No other abnormal metals were found.

10. Dr. R. E. Smith (Rugby): 'Familial congenital immunity against measles.' It is well known that a small proportion of individuals escape measles, despite frequent exposures. One explanation which would account for this immunity is that they have been exposed to measles during the first six months of life and enhanced their natural immunity without showing signs of the disease. The following history led to a test of this hypothesis:—

> A housemaster, aged 40, was the youngest of three boys. The elder two had measles while their mother was suckling the youngest. He was subsequently exposed to measles at his preparatory and public schools, and had always visited with impunity those in his house who had measles.

From 1931–1939, of 957 boys leaving Rugby, 38 had not had measles, although all had been exposed, several of them on numerous occasions. Accurate details of the history of 18 of the 38 boys were obtainable as a result of a questionnaire. The answers did not bear out the theory mentioned above. All had been exposed at least twice. Only one was known to have been exposed during the first six months of life. He was the son of a physician who 'on many occasions exposed him purposely to chances of infection in order that he might contract measles.' His mother had had measles as a girl; his brother and two sisters had measles when he was six months old. The other seventeen were not exposed during the first six months of life. It has been said that the immunity inherited from the mother depends upon the transmission of immune bodies from mother to embryo. This may not always be so, as the following valuable by-product of the investigation shows :—

Four of the eighteen mothers stated that they had never had measles. That they have some congenital immunity which is handed down to their children is more than a probability, because the first mother had one son and two daughters: the second, two sons and four daughters: the third, four sons: and the fourth, three sons and two daughters: and not a single one of these eighteen children have had measles. If this observation is confirmed, it will mean that mothers who have not had measles—and presumably in England and the civilized countries all mothers must have been exposed to measles—will breed children also immune. They will not require serum therapy, the more especially if one of the family has been exposed to infection and has escaped. It is difficult to explain satisfactorily why the mothers have this immunity. If they possess a superabundance of immune bodies, their blood would be able to prevent measles in the same way that convalescent serum does. A second explanation is that they are immune to the measles virus in the same way that man is immune to other organisms usually called non-pathogenic and as domestic animals like the cat, dog and rabbit are immune to the measles virus, even if injected into their blood in enormous quantities. The third possibility is that the mothers are perpetual carriers and so unwittingly infect their children in the first six months of life; but if this is so it is probable that they would be a source of infection among other children. No other instance of the transmission of immunity in this way appears to be on record.

Discussion: 'The Future of Paediatrics'

DR. J. C. SPENCE (Newcastle), opening the discussion, said that we had to plan for three branches of paediatrics. (1) The domestic practice of paediatrics which concerned mainly practitioners and paediatric consultants. (2) Public paediatric services, such as child welfare and school medical services, which concerned mainly the Government and local authorities. (3) The hospital and institutional treatment of children, including teaching hospitals which would be mainly concerned with setting up a high standard of hospital work, teaching and research. There would be no real progress in any of these branches unless paediatricians made known their advice and pressed home their demands. Without the help and advice of trained paediatricians with an interest in, and experience both of preventive and clinical paediatrics, child health policy will go astray and result in uninspired formalism. Dealing particularly with teaching and hospitals, Dr. Spence said that for the success of all branches of paediatrics, we must have active progressive teaching departments where paediatricians can be trained. He advocated that a paediatric teaching unit should be a hospital or clinical unit closely associated in a hospital centre, with other teaching hospitals and the university scientific departments. This was easier to attain in the provinces than in London. The unit should provide not less than 100 beds and adequate out-patient and clinic facilities. These should serve as consultation centres both for practitioners and the public health services.

In the interests both of clinical science and the welfare of patients, we should forsake the artificial segregation of the patients into medical wards and surgical wards. They should be regrouped as clinical units with wards arranged according to the age of the patients and the character of their disease. To these units, physicians, surgeons and specialists would be attached. This plan has been operating in two of the Newcastle hospitals for some years with outstanding success. It has lead to more careful supervision of the nursing, to a better training of the residents and to a closer system of consultation on individual patients between members of the staff. While specialists would be used in the wards to the fullest extent the ultimate charge of the patients must be in the hands only of those trained and experienced in paediatrics.

Dr. Spence stressed the importance of morbid anatomy. This was a field of research which still remained to be fully explored in paediatrics. This branch of pathology was the basis of our understanding of diseases. It must not be confused with so-called clinical pathology which was mainly a matter of diagnostic tests which was not pathology. In university paediatric hospitals or departments, the pathologist should be a member of the university department in daily contact with fellow pathologists.

The clinical staff should consist of four or five senior paediatricians, and the head of each unit should be either a whole-time teacher and researcher, or whole-time worker with the right to private practice at the hospital only. Some of the other members of the staff could be engaged in private practice outside the hospital.

In any discussion on hospitals a clearer understanding could be obtained by dividing the problem into its three component parts of (1) Government; (2) Administration; and (3) Clinical work.

In any plans of development or reform these parts should be separately considered. In considering the government of hospitals, we must face the inevitable rise of the local authorities as hospital authorities in the future. This might be for good or for evil. In the case of paediatrics, which took into account the whole welfare of the child, it would certainly be for evil unless the authorities were wisely advised by those with a practical experience of paediatrics both in the homes of the people and in hospitals.

The chief administrator of a hospital should be a medical man, with a special training—but it was necessary that this training should include an experience of administration in non-medical institutions. A medical administrator could interpret the needs of the staff and so save much of their time which would otherwise be spent in committees. Generally speaking, hospitals spend too little on administration, and when the cost of administration fell below a certain percentage of the annual expenditure, inefficiency and waste were likely to occur.

Apart from hospital policy, there was one other problem that the British Paediatric Association should consider: that was in what form advice, help and constructive criticism might be given to the Ministry of Health in formulating its paediatric policy. A single advisor would be unsatisfactory. Time, and a Whitehall Office, would deaden his interest and shrink his experience. It would be better to have an advisory committee with membership on it lasting only for a term of years. But, outside this, the British Paediatric Association must remain as it has done for fourteen years, a strong cooperative body, interested in teaching, practice and research in all branches of paediatrics, and fostering friendship amongst British Paediatricians.

DR. ALAN MONCRIEFF (London), following Dr. James Spence in opening the discussion, explained the origin of the Memorandum put forward by the London Members of the B.P.A. He also explained what was being done by a joint Lay and Medical Committee of the Voluntary

Children's Hospitals in London. Dealing in more detail with the London members' report, he stressed three points:—

(1) The necessity for close cooperation with the health authorities as regards school medical work and child welfare work.
(2) As regards education, he explained the possible dangers of Children's Hospitals losing their identity and becoming departments of General Teaching Hospitals.
(3) He drew attention to the fact that there was a real danger of the special Children's nurses' register being abolished, and one reason was that certain Children's Hospitals had recently appointed matrons without this diploma.

(The London Members' Memorandum is reproduced at the end of this report.)

DR. REGINALD LIGHTWOOD (London) pointed out that the future of paediatrics holds the prospect of an improved and better coordinated hospital service, consultant services made available for all children, further important developments in preventive medicine and improvements in paediatric education for doctors, nurses, etc. Although these changes will come gradually, the British Paediatric Association should *now* play an important part in initiating and directing them.

He also stressed the need for well-trained paediatricians who are not consulting physicians, but engaged in domiciliary paediatrics, welfare and other clinic work, and in hospitals. The matter of their training, he felt, should influence academic policy.

Dr. Lightwood also pointed out that in London, as in other large cities, a University Centre for paediatrics is certainly needed for post-graduate training, and this, he felt, should be set up without delay, others being added later if needed. There should be a Professor of Paediatrics in this University Centre, and the hospital and academic sides of preventive paediatrics should be encouraged. A solution to the difficult problems facing the London Children's Hospitals would, he thought, be aided by a satisfactory teaching plan.

Finally, Dr. Lightwood felt that paediatric facilities of all kinds should be made more widely and evenly available throughout the country, and the sphere of activity of the consulting paediatricians should be increased.

DR. N. CAPON (Liverpool) referred to the shortage of applicants for training as Sick Children's Nurses, and reminded members that the ill-effects of this present situation, which was causing grave concern in a number of centres, would become more serious month by month, unless steps were taken to raise the status of the Sick Children's nurse. It was obvious that paediatrics would suffer greatly if there were not a sufficient supply of nurses who had received adequate training in the subject; and some of the children's hospitals were in danger of having to close their doors. He held that the problem could not be satisfactorily solved by accepting a short period of service in children's wards as adequate training for paediatric nursing, and he therefore proposed that the British Paediatric Association should make strong representations to the General Nursing Council that the Register of Sick Children's nurses should be maintained. He further proposed that the B.P.A. should intimate to the General Nursing Council its willingness to send a deputation, if so desired, to discuss the whole question of paediatric nursing.

DR. F. M. B. ALLEN (Belfast): After complimenting the openers of the discussion, Dr. Allen pointed out that civil service officials were frequently lacking in initiative and the pioneer spirit, and appealed for a policy of direction from the Association. He indicated that in his opinion the Association should inform the Ministry of Health as to what it judged to be in the best interests of child welfare and child health, as it was unlikely that the Ministry would seek information on its own initiative. He hoped that the Interim Report of the B.M.A. Planning Commission would be carefully studied by members and that the views of individuals or of the Association would be forthcoming for presentation to the Commission.

On the subject of the setting up of a Standing Committee to report on various paediatric problems, Dr. Allen emphasized that such a course would be an innovation in the Association, as hitherto, the policy had been to interest members in the academic side of paediatrics; whereas if the Committee were to be formed to present its views upon health affairs, it would indicate interference with matters of administration and medical politics. The Executive Committee had never received an instruction from the Association to interfere outside the academic sphere, and he thought that there was no need for a new Committee and that the Executive Committee would fulfil the desired functions adequately.

DR. R. COLLIS (Dublin) stressed the importance of being perfectly clear as to what State Medicine meant in actual human terms, and pointed out that in point of fact it would mean handing over the medical profession to become part of the patronage of a central and local authority, whose main idea must always be ' safety first ' or the maintenance of the status quo.

He advocated that what was needed was a national medical service, e.g. like the B.B.C., but not a nationalized medical service. Secondly, he stressed the importance of providing

maintenance for such a national medical service by an insurance system much more complete than the one existing at present, and also one which provided for children. Thirdly, he urged that what may be called University Medicine should be made the centre of the medical organization, and in this connection, he especially stressed the importance of the Hospital for Sick Children, Great Ormond Street, advocating that it should be made the centre of the paediatric organization and should be completely re-organized so as to make possible the setting up of an active Chair of Paediatrics at the hospital, the Professor holding a predominant position in the hospital.

DR. WILFRID SHELDON (London) endorsed the need for planning a post-war paediatric policy. At the same time, as the Association was almost entirely composed of clinicians and the war had created numerous clinical problems in childhood, he urged that the Association should immediately turn its attention to the solution of such problems, and should approach the various authorities concerned as an organization, prepared to advise on, and assist in, measures to deal with such questions.

DR. C. W. VINING (Leeds) stressed the importance of better housing, feeding, hygiene and education in the paediatric problem. If the standard of life of the hospital children could be raised to that of those living under happier conditions, the need for children's hospitals would largely disappear. He asked what was going to happen to the women and children after the war and expressed a hope that the children at any rate would not be caught up into National Health Insurance, and insisted that the individual who supervised the 'well' child should be the individual who looked after him or her when ill. This could only be brought about by a medical service for children—and possibly their mothers—of a very comprehensive kind, to include all those activities in relationship to prophylaxis and welfaring, and the treatment of the child when ill. Such a scheme had been put forward recently, in which the family doctor would be in charge of a unit comprising possibly 1000 children and their mothers, and he would work in close relationship to a hospital service which should provide out-patient consultations and in-patient beds. The proposed scheme visualized the bringing together of obstetrics and children's work into closer union. He asked the meeting to remember that the mass of paediatric work must still be carried out by the family doctor who might confine himself to women and children or act in relationship to both National Health Insurance and the children's medical service. He hoped that the future would see a greater measure of care and treatment carried out in the home rather than at hospitals and clinics.

DR. K. D. WILKINSON (Birmingham) said that it seemed to him that the function of the B.P.A. in the present position was to tender advice to any authority interested in paediatric problems. In the past it seemed, he said, that we had considered our own little problems; at present it is urgently necessary to widen our view and to consider those national problems which were likely to become serious in the immediate future. Having considered the problems, we must, he said, be prepared to tender advice about them, and he felt that this advice should be broadcast to the members of the association as well as offered to outside bodies.

DR. A. G. OGILVIE (Newcastle-on-Tyne) said there appeared to be general agreement that the Association ought to take some active part in the future planning of paediatrics, and to focus the discussion, he proposed that the Association should set up a Standing Committee to consider various aspects of the future planning of paediatrics, this committee to have power to set up sub-committees for special problems, and to act in the name of the Association. After further discussion on this proposition, an amendment was proposed, substituting the Executive Committee of the Association for the Standing Committee mentioned in this resolution. The original resolution was withdrawn in favour of the amendment, which was subsequently passed.

DR. L. G. PARSONS (President) (Birmingham) reminded the meeting that the Ministry of Health was purely an advisory body, and had no power to order anything to be done. He thought the Ministry of Health would, however, give their support to any scheme which was presented to them in the right way, and pressed with vigour. He agreed with Dr. Spence that most of the difficulties lay in the fact that the local authorities were completely independent and could do what they liked. He felt, however, that there must be closer cooperation between the hospitals and welfare centres. He also endorsed the view that a Committee of Paediatricians should give advice to the Ministry of Health, rather than one individual. He felt certain that paediatrics should be more stressed in the final examination of the Students, and he hoped that the meeting would instruct the Executive Committee to press this.

DR. DONALD PATERSON (London) thought that, up to now, the Association had not pressed the local authorities to see that those appointed to welfare centres should hold the D.C.H. He hoped that the Association would instruct the Executive Committee to draw the attention of local authorities to the advantages of this degree.

DR. RICHARD ELLIS (London) raised the question of regional planning in paediatrics, and the establishment of consulting centres visited by physicians on the staff of a University paediatric unit. He also emphasized the necessity for adequate publicity for preventive and other measures sponsored by the Association. Regarding post-war reconstruction in Europe, he felt that the experience of paediatricians of all nationalities would certainly be required in combating the effects of widespread famine conditions in German-occupied countries. He also said that he felt the Association might usefully be in touch even at this stage with such organizations as the Famine Relief Committee, the International Commission for War Refugees, and the International Red Cross, who were already considering the problems of large-scale relief work amongst children.

Summary:

Proposed by Dr. J. C. Spence, **seconded** by Dr. A. G. Ogilvie, that—

'This Meeting instruct the Executive Committee to interest themselves in, and advise any appropriate authority in current paediatric problems, and for this purpose be empowered to coopt members both from the association and other bodies.'

Current Problems for the Executive Committee to consider and take action upon:—

(a) Nutrition (with special reference to the official dosage of vitamin D), neonatal mortality, day nurseries, breast feeding in relation to female labour, juvenile delinquency and the early diagnosis of tuberculosis.
(b) Future paediatric policy with special reference to the memorandum prepared by the London Members of the Association.
(c) Paediatric aspects of 'group practice' or very similar developments, arising out of the forthcoming report of the British Medical Association's Planning Commission.
(d) The sending of a resolution to the General Nursing Council, and to the Nursing Division of the Ministry of Health, strongly urging the retention of the special register of Sick Children's Nurses.
(e) What support the B.P.A. should give to the Save the Children's Fund and the International Commission for refugee relief.
(f) That paediatrics should form a more important part in the final examination of students.

Memorandum on Paediatric Policy prepared by the London Members of the B.P.A.

A. Hospital care for children in the London Area. At a meeting held recently by the representatives of the Children's Voluntary Hospitals, a committee of eight were elected to report on hospital coordination. We suggest that, to avoid duplication of work, the London Group of the B.P.A. shall appoint a standing committee to keep in touch with 'the Committee of eight' and with other committees which may be established to deal with the children's department of general hospitals.

The main object of this standing committee will be to advise and assist the representatives of the Children's Voluntary Hospitals and, in order to do this the more effectively, it may be wise for them to discuss the broad lines of a hospital policy satisfactory to paediatricians. For example, should the London district be sub-divided and the hospital accommodation in each area grouped on a key hospital? In this case should the key hospital be a teaching hospital or a children's hospital? Should we attempt to retain complete and self-contained hospitals in the centre, or have only a minimum of beds in the centre with larger hospitals in the periphery? Should the policy of amalgamation of small hospitals be moulded on a larger scheme of grouping?

B. Preventive Paediatrics. A unified plan of preventive and curative paediatrics will not spring up in a night; improvements will be gradual and our policy should be to guide evolutionary changes in directions which we, as paediatricians, believe to be beneficial for children. Thus it is suggested that committees be established with the following primary purposes:—

(1) To be available to give expert and impartial advice to public authorities, such as the Ministry of Health, the Board of Education, London County Council, Middlesex County Council, on matters of organization and personnel, especially with reference to London.
(2) To be a point of contact with Medical Officers of Health.
(3) To assist in initiating improvements in the arrangements and continuity of Infant Welfare Work, School Medical Inspection, and in schemes of immunization.

C. Education. It is also suggested that the London members should consider and advise on the education in paediatrics of the following:—

(1) **Medical Students.** It is possible that much detail could be removed from the curriculum and a more general course in paediatrics laid down. Should this teaching be carried out at undergraduate teaching hospitals, or at Children's hospitals affiliated with them, or at both?

(2) **Postgraduates.** With such a shortened undergraduate curriculum, the advisability might be considered of instituting obligatory postgraduate education in paediatrics for all those whose work will bring them in contact with children.
(3) **Nurses.** The existing facilities for training children's nurses might be reviewed and improvements, if found necessary, recommended. For example, is there at present enough provision for instruction and training on the newborn infant?
(4) The training of **Health Visitors** in regard to infant hygiene and child health (also school nurses).

D. The Practice of Paediatrics. The London members may be required to guide the evolution of paediatric practice in this area. What should be the functions of and qualifications for the following:—

(1) **Consulting Paediatricians.** (The B.P.A. are likely to be asked, in the near future, to assist in the preparation of the ' Register of Consultants and Specialists.')
(2) **Whole-time Paediatric Teachers** in Universities.
(3) **Those engaged in Whole-time Preventive Paediatrics.** (a) Infant Welfare; (b) School Medical Service.
(4) **General and Panel Practitioners** whose work to some extent involves paediatrics (especially in view of probable extension of N.H.I. to include families).

In future two special diplomas perhaps will be wanted: (1) A higher qualification of M.D. or M.R.C.P. standard conducted by the College of Physicians, and intended for registrars and teachers. (2) A special one for Welfare medical officers and some general practitioners—a D.C.H. conducted by the two colleges.

RECOMMENDATIONS. This London group believes that an effective linked hospital system, and an organized and efficient service for Children's Health should be the first objective. Therefore they recommend:—

First, advice and assistance to the representatives of the Voluntary Hospitals, who are now considering the hospital aspect of paediatrics.

Secondly, the setting up of machinery by which contact can be made and maintained with Public Authorities.

Thirdly, consideration of the education and training of those who will engage wholly or partly in paediatrics.

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